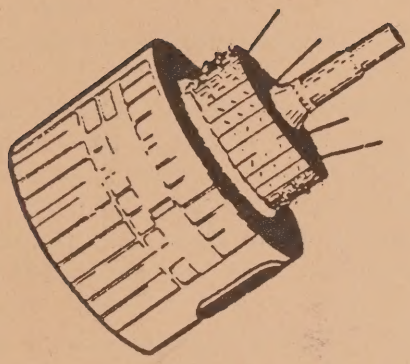
NEWSLETTER No. 15



REMOTE IMAGING GROUP

DECEMBER 1988

REMOTE IMAGING GROUP (R. I. G.)

NEWSLETTER No. 15 DEC 1988

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Editorial and Secretaries page

I wonder if you are reading this before Christmas, I hope so we have pulled out all the stops to get this final issue for 1988 actually out in 1988, I hope we made it.

Many of the more observant readers will have realised that the descriptions of the centre-fold pictures did not correspond with the images themselves. This was the caused by a mix-up at the place we get the picture pages produced, not our actual printers Meridian. Anyway we got a free print of the right pictures this time round.

My last comment on the last newsletter concerns the NOAA predictions, the orbit reference data for the newly launched NOAA 11 was not very accurate and the resultant figures for January were well out. Now that the orbit and therefore its parameters have stabilised we can expect more accurate predictions.

On to this edition. So many members have requested a reprint of the NOAA Sync detector which came out in the first issue of RIG. You can find that and other reprints of the RIG VHF Receiver and Dartcom Meteosat downconverter specifications in this edition.

Now the bad news, its subscription time and all RIG members should renew their subscription in January. Des Watson's postman has been warned and the Post Office actually allocate a sorting box just for Des. The subs have been increased this year to £5 and we plan to hold this figure for some time to come. The extra funds will allow us to improve the newsletter content and our stand at the Rallies we attend.

As a result of publishing the index I expect to receive a number of requests for back issues. Please note that we only have issues as far back as RIG 8, ie the 1st issue in 1987. If there is sufficient demand, articles from the earlier issues will be reprinted as time and space allows. Back issues are £3.00 for each full year ie 4 issues, including p&p.

Rallies for 1989:

RSGB National Convention at the NEC, Birmingham
VHF Convention, Sandown Park
BATC Rally at Crick
Elvaston Rally near Derby
Woburn Rally

Please note the AGM will be held at the Sandown rally as usual.

Thats it for 1988, the very best for Christmas and the New Year and hope to see you all in the 1989 membership's list

Phil, G8XTW

CHAIRMAN'S WAFFLE

Some of you might know that we hold committee meetings approximately every six weeks, and they are normally held at Phil's. For a change Henry offered his abode for the meeting in November and was accepted. To my amazement everybody that had indicated that they were attending managed to find me! Mind you it's much easier to dial the STD. number, but it made a change. It was much more difficult to do the return journey in the dark with the instructions in reverse. I trust nobody got lost on the way home.

As the subscriptions are due this is the last Newsletter you will receive unless you fill in the membership form in the middle pages and send off your subscription! Again we don't want to loose you and try to make renewals as simple as possible. We have the quiz on the reverse again. You might think that it is all a lot of fuss about nothing, but last years questionnaires produced several surprising results. Another item we were also quietly commenting on was the lack of recent complaints about the paging interference. Perhaps you will tell us that it is as bad as ever. Maybe you have modified your receivers or the interference is either much less than it was or has disappeared altogether, well let's hope so. Tell us all about it by filling in the form and add your own comments if necessary.

I've tried the Infra Red Laser but to no avail, it would only mark standard Enlarging Paper if it was left exposed for several seconds, obviously it was not going to be satisfactory and has been shelved. Fresh ideas and further thought is required. There is a visible red semiconductor laser now available from Toshiba, but at £285 they are not at Henry's prices yet. Mentioning Enlarging Paper has just reminded me of a tip I have find very useful for drying negatives. Use the Wife's spin drier (vertical axis type), leave them in the developing spool but put something in on the opposite side to balance the machine. These machines develop very high G forces and quickly remove the water content. In just a minute or so they are nearly dry leaving only a small amount of moisture absorbed in the emulsion. hanging it out to finish off in the fresh air completes the job and there are none of those water marks that so often appear just where they shouldn't.

Because we are now receiving a much reduced signal from Meteosat 3 during the low power segments, you need to get the best possible signal to noise from your receiver. The following might be food for thought. In the past I have used a remote signal source to adjust and modify various preamps and converters etc. This signal source does not have to be very complicated or powerful.

A crystal oscillator has sufficed in the past, but as the frequencies have increased then multipliers etc. might be required. Anything will do as long as it is receivable over a distance of say 10 metres. You do not need precision attenuators or the like, just a 12v. feed to the remote site. A waterproof box or a sheltered site far enough away to get a S6 or S7 signal is just whats needed. If the signal is too strong you can turn the antennae away from the source until it is just right. Then you can peak all the operator adjustable controls for minimum noise out of the receiver.

If the noise is getting very low then turn the antennae further away until the signal is only say 25% of the no signal noise output. You get the least noise output (maximum quieting) for the smallest signal. By using this method you get the best performance from everything including the antennae also optimum matching as well. A small co-axial probe on the edge of say a dish can give quick checks to confirm or deny your equipment is working correctly. Please note that you will have to turn your antennae away from Meteosat otherwise it's signal will interfere with this system of alignment.

In the past I have noted that the P.L.L. in the subcarrier circuit of the frame store (4046) was not doing it's job properly. In the rush to get it completed I had used a 1000pf ceramic capacitor which was very temperature sensitive. I have now replaced this with 1% silver mica and realigned the frequency. During a Meteosat or NOAA picture I can now disconnect the antennae for several seconds and the syncs do not move very far.

In the past we've attempted to get the last newsletter of the year to you in time for the Christmas period, but alas not very successfully. This time we are really trying hard and with a bit of luck we might be successful. In any case may I wish you all many Seasonal Greetings, a very Happy Christmas and a pleasant and prosperous New Year. May you remember your colleagues working away on similar projects who are also looking for the 5v rail that should be there, the polarised capacitor that you know is the right way round but isn't and the diode that's open circuit. During the quieter moments just sit back and reflect upon all the successful projects you've managed to complete, the ones you wish you could complete and the ones you aught to complete, by then it will be time to cut the lawn!

PS. Don't forget to send your subscription off because we need you all and you won't get another reminder.

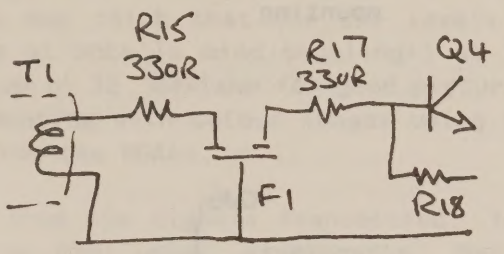
Best wishes and 73's
Henry

CIRKIT Receiver Mods - by Gordon Train

Yet another tale of removing Mercury/Racal pager signals from weather satellite signals! I won't go into too much background just give you my final version.

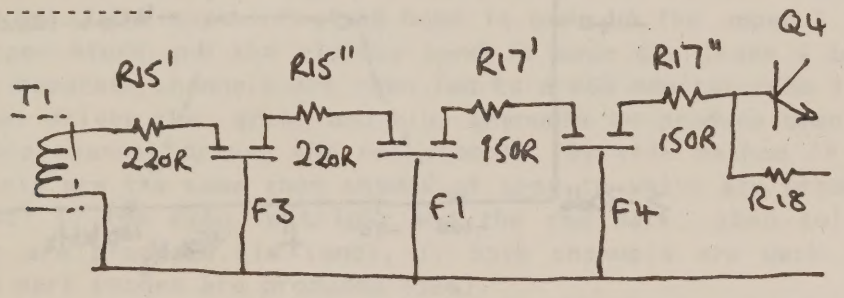
Receiver CIRKIT KIT (I understand the MSR20 is similar).

IF original design (as supplied)



There are 2 ceramic filters in the design but I've only modified this part of the circuit.

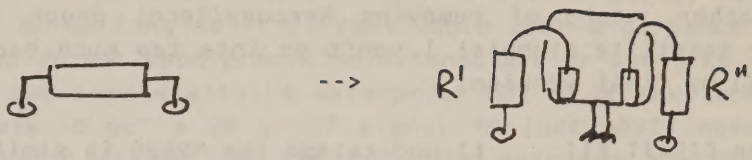
After modification



F3 and F4 are 10.7 MHz filters. Reading all the letter/articles in the RIG magazine, it may be better to use a wider bandwidth filters if you can get away with it but in my location I have a strong interference signal from the pagers (they are less than 1 mile away) and therefore went for maximum rejection (see over for response). There is also the Gas Board transmitting on approximately 138.9 MHz 4 channels at 25 watts each, at the same site. Even with a total of 4 ceramic 50kHz filters it still doesn't make 137.85 mHz totally interference free, I'll live with that for now.

I must admit that the values of R15', R15", R17'and R17" were chosen because I had them! The filters should be matched into approximately 330 ohms but they seen ok with 220 ohms and 150 ohms.

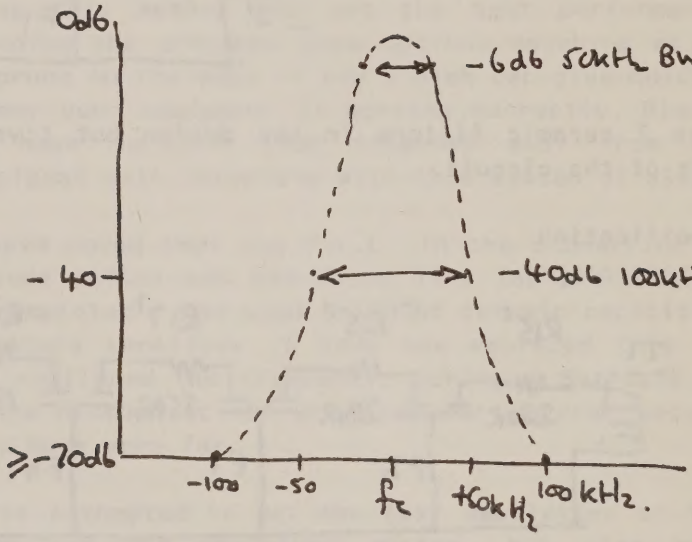
Mounting the filters:



original resistor mounting

using optional mounting holes for the two new resistors, solder filter middle pin to ground plane. Fold outer pins upwards and join to the resistors.

Response:-



Obviously with more filters in the circuit we loose gain but I've modified the front end of the receiver (in the past) and this should make up the gain (printed in SW. Magazine April 88).

As supplied the 2 front end 3SK88/s are not very well run. The gates are not set up for optimum performance ie noise figure could be <4db and gain up to 15db! (not 6 and 5db as supplied)

Change R2 to 39K, change R7 to 39K (providing your using 12v supply). Retuning may be necessary and ensure your receiver is in a screened case as with all this gain it could go unstable! R37 could be removed reduce damping but I found I needed a value of 10K to stop it hooting. After these mods I've found no pre-amp necessary and I can get passes from the North African coast to Greenland and I haven't even got the aerial outside!

My System

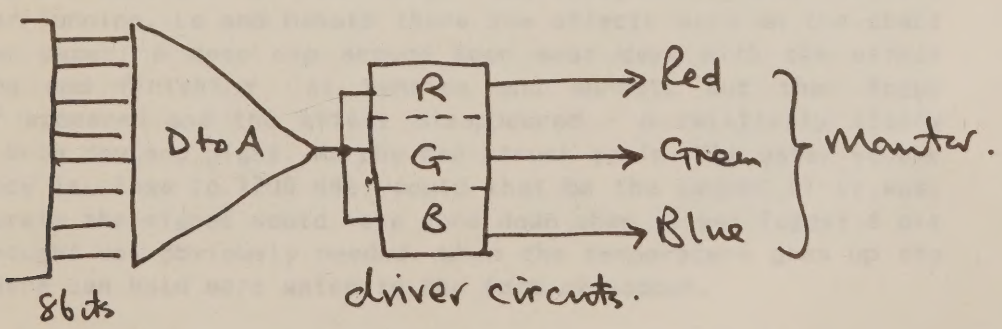
As I've said I am using the CIRKIT RX. I record the pass due to computer RFI and then decode them using my own design decoder and a Lynx 48K computer. The Lynx can give good pictures in its own right. Resolution 256x248 with 8 levels/colours. I advanced from this to a frame store of my own design to give 512x 256 resolution with 256 level's of grey or colours. You may think that the 256 levels of grey are excessive (256 colours at once is mind boggling!) as the satellites only seem to require up to 32 maximum for good pictures, but I have recently been experimenting with colour images using the two different wavelength bands from the NOAAs.

Good colour images can be made from the signals transmitted from NOAA 11 before it switched to the usual wavelengths. During commisioning it transmitted channels 1 and 2 (as opposed to 2 and 4 as in normal operation) and comparing the 2 images shows the only difference seems to be land.

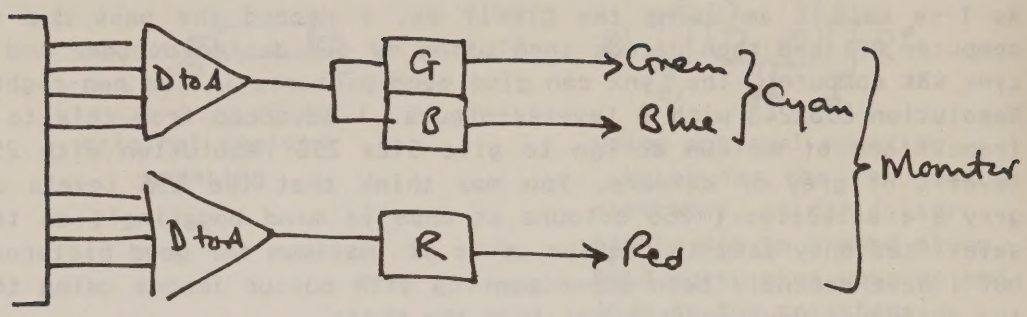
To generate the colour images I limit both the channels to 16 levels (4 bits) The near infra red band is made up the upper 4 bits in the frame store and the visible band is made the lower 4 bits. These two separate channels are then fed to a RGB monitor. The infra red channel drives the green and blue channels to produce cyan and the visible channel drives the red channel. By this method if the two channels are the same then shades of grey to white are produced (ie clouds) If the cyan is bright and the red dark then colours near cyan are produced (ie land), if both channels are dark then black and dark shades are produced (sea).

Normal (black and white images):

Obviously these are only schematics as in practice we need syncs and blanking waveforms to produce the video waveforms.



Coloured Images:



Anyone using a computer with colour images (ie Atari ST, Amiga etc) should be able to get similar images with suitable software and choice of colours. It is well worth experimenting.

Editors note:

Gordon sent in two colour slides demonstrating the above technique but you will understand that they can't be reproduced here at practical printing costs.

METEOSAT 2 - Variations in Signal Strength

Over the past few years periodically I have been receiving signals from Meteosat and have taken everything for granted. Now that Meteosat 3 is in operation and because of it's antennae problem I found that the signal received by my Quad Loop Yagi was less than satisfactory. The signal level was just that bit more marginal than I expected. The GASFET had committed Hiri kari yet again and yet again been replaced. Henry was left as usual with not quite enough -- signal that is. It seemed to vary and at times the signal was somewhat below it's usual level. Then I realised that the signal was usually lower in the daytime than at night. It must be the mains I thought, but it couldn't be - the 12v supply is stabilised (well within 0.05 of a volt)!

All this provoked me into installing a chart recorder to look at the signal strength meter output. Behold there it was, the "Daytime Effect". Well that name will do to start with but I'm sure it will change when we really know what the cause is. Let me describe what I did. At the beginning of this "scientific investigation" (early November) dawn followed by sunrise was about 7-30 and 8-00 A.M. respectively. The Meteosat signal at sunrise started to go down by just a little at first but by Noon the signal would be down by as much as 2 or even 3db. After this midday dip it would then gradually increase back to its normal level by 4-30 to 5-00pm. This increase after noon was much slower than the reduction was before noon. After dark the signal might remain constant until dawn the next day. But life is never that simple.

Even during the night the signal varied, not as much, but never the less it didn't remain constant. This "Nighttime Effect" is not as strong as the daytime effect but has the opposite effect it gets stronger. The maximum variation that I have noted so far is about 5db peak to minimum (3.75 to 7 microvolts at 137 MHz IF.)

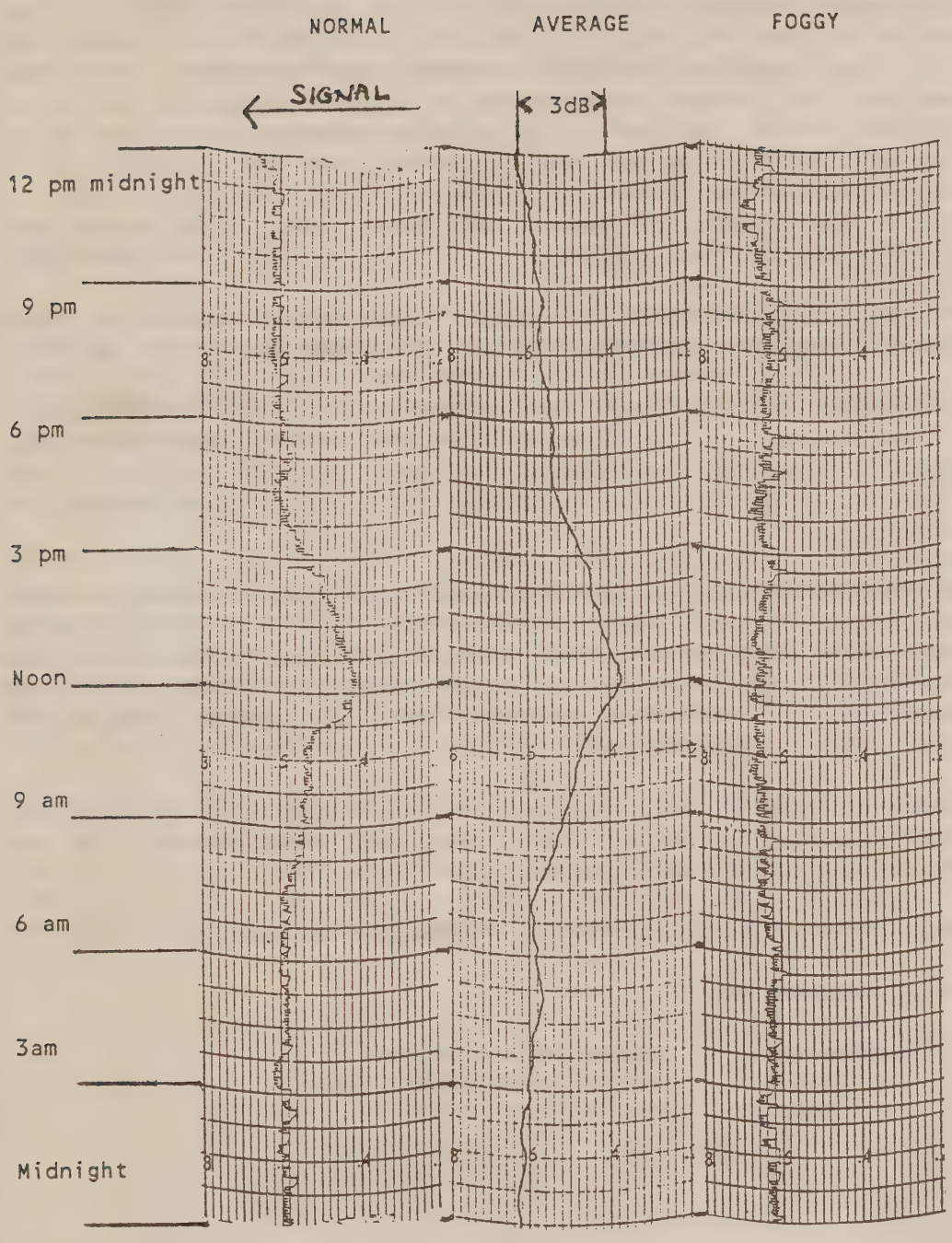
After approximately 14 days I thought that I would have sufficient evidence and tore off the chart paper and analysed it, but left the recorder running. Lo and behold there the effects were on the chart recorder paper. A deep dip around Noon most days with the effect starting and finishing at sunrise and sunset. But then foggy weather appeared and the effect disappeared - a relatively steady signal both day and night. Murphy had struck again. The water vapour frequency is close to 1700 MHz, could that be the cause? If it was, then surely the signal would have gone down when it was foggy! A bit more thought was obviously needed. When the temperature goes up the atmosphere can hold more water in the form of vapour.

Bingo that's shot Murphy! When it is foggy, the fog is in the lower 50 to 100 ft. of the atmosphere, and as the temperature normally goes down with increasing altitude, it is possible that the remainder of the path is quite low in water vapour. You must remember that as the signal arrives from 30 degrees in my latitude and the weather (moisture content) is mainly in the lower levels. It is only the lower parts that the signal doesn't reach so strongly - perhaps I require a refill of something!
Using approximations most of the moisture is concentrated in the lower say 2 kilometres of the atmosphere by reason of pressure and temperature. With an elevation of 30 degrees this would be in the region of say 6 kilometres path length. After travelling 35000 Km you would not expect it to be affected by that last 0.01% But it would appear as though this last section is just like a variable attenuator. if the temperature and water content are high, then the signal is at it's weakest. If it is freezing and the middle of the night then the signal is at it's strongest. These two conditions don't always occur together and we usually have something in-between.

It would also appear that if it is foggy this lower section of atmosphere is not very thick and does not absorb much of the signal, the upper parts might be low in moisture content. If it is raining the signal is not significantly lower, the rain is mostly in the form of droplets and less in the form of vapour. It would appear that the path loss is more dependent on the quantity of water vapour that the signal has to pass through. I have also looked at the water vapour images - E2 but have not found very good correlation with this effect. This could be explained by the E2 images being from higher altitudes, i.e. do not penetrate to the lower levels.

This article is not meant to be a definitive statement as to the observations, causes, reasons and effects, but more in the nature of a discussion document. I hope it starts you looking at the S meter a bit more often and also to check the linearity of its circuits. There is no point in having a S meter if it is hard over and does not indicate small changes in signal level. My own was modified and reasonably accurately calibrated from a rather expensive signal generator and now gives a near linear scale between 0.5 and 7 microvolts (Dartcom receiver). I find this together with the meter which has approximately 250mm scale length to be very eye opening when aligning either antennae or equipment, you can get that gnat's wotsits more! A selection of chart recorder records is included overleaf to show you more:- A normal day, a foggy day, and the average response over 14 days.

Henry Neale, G3REH


NORMAL
AVERAGE
FOGGY
SIGNAL
3dB
12 pm midnight
9 pm
6 pm
3 pm
Noon
9 am
6 am
3am
Midnight

NOAA IMAGE SELECTOR Les Currington et al

It is nearly 2 and half years since this article was printed in RIG 1, the very first RIG newsletter. Many members have requested information/reprint so here it is together with some follow up notes from other members.

After two years of using the YU3UMV scan converter, it was decided to correct the problem of quickly selecting the IR or Visible light portion of the picture being received. Looking at the way the pictures are sent it seemed that the solution lay in detecting the 1040 Hz or 832 Hz tones which are present prior to the IR and visible portions of each image line, and feeding this to the YU3 001 circuit board.

A small board was made up which fitted inside, behind the front panel of my unit, and only involved a minimum amount of re-wiring.

On looking at the circuit (see centrfold area for circuit diagram) it would appear at first glance that the output from the 12 volt supply of the 4093 would damage the input to the 4011 pt123, but when the diodes reach the 5 volt supply of the 4011 the diodes are cut off.

The tuned circuits are easily aligned by looking at the sync pulse on a scope at the 1 meg resistor (pts x & y on circuit). A pre-amp was found beneficial in order to give sufficient signal when in the noise, the gain of which should be adjusted on a weak signal with the input of the scan converter set at the correct level to get full input of grey level.

This add on effectively replaces the tone decoders for the orbiters (see fig. 6, page 202 of the original VHF Comms article 4/82) and leaves one of the tone decoders spare.

This could be set up for one of the Russian satellites.

Major components:

IC1	LM 348	DIODES 1N4148 OR SIM.
IC2	741	PCB SEE CONSTRUCTORS CORNER
IC3	4093	VR1 SET SYNC LEVEL
		SW1 BIASED CENTRE OFF
		SW2 PART OF ORIGINAL SYSTEM

Some members have experienced difficulty in getting the unit to operate, due to lack of input to the 4093.

This IC should fire with an input of 6 volts, but tests have shown this to vary considerably with manufacturers. In order to operate over a wide range, the resistor 39k between the two filters should be reduced in value until the second filter is running at max amplitude, a value between 27k and 39k should be OK.

LES G8LOK

Subsequent notes:-

Dave, G3XOU has offered an alternative mod whereby the 4093 is run on a reduced voltage via a 100R resistor and 8.2v zener combination. This will also make the IC3 fire more readily.
This modifaction together with the LED indicators have been incorporated on the current board.

LED INDICATOR FOR VIS/IR SYNC SELECTOR.

Adrian, G6ZOJ, has sent in a circuit, (now incorporated in the main circuit diagram see centrefold), to add visual indication of detected sync tones to the G8LOK design. He found it very useful for setting up the tone detectors. The LED's light on each sync pulse. He also prefers to use push buttons rather than the biased centre off toggle of the original design. Provision for these indicators are included on the PCB now available.

The PCB for the above circuit is availble from the secretary, see RIG Shop corner. It also includes a 2400 Hz XTAL oscillator to provide an alternative sync source for displaying Russian satellite pictures.

2400Hz Externally Applied Sync. Problems.

There have been odd problems reported with the skewing of pictures up to an inch or more when using external synchronisation on NOAA's, despite the fact that the frequency has been set up correctly. Note that you will get a small amount of skew when the satellite is coming towards you, no skew when abeam or overhead, and skew in the reverse direction as it travels away from you, this is normal and is caused by the Doppler effect.

It appears that the mark/space ratio of 1:2 on the LOK boards, can cause a problem with some combinations of manufacturers IC's.

The LOK board circuit, using a 4060 and a 4518, can easily and cheaply be modified to 1:1 ratio, or if you are building this from scratch you can omit, 4518, 1n, 2 diodes and 1 10K resistor, buy a 2.4576MHz crystal instead of the one quoted.

Frequencies available from 4060 pin using a 2.4576MHz crystal:
(All frequencies are in Hz)

FREQ	PIN	FREQ	PIN	FREQ	PIN	FREQ	PIN
2457600	9	4800	13	153600	7	2400	15
76800	5	600	1	38400	4	300	2
19200	6	150	3	9600	14		

MODIFICATION:

Remove the crystal and replace with 2.4576MHz crystal (Maplin #1.95), cut the track between the diode and the end of the 10k resistor, (the end almost underneath the 10uF capacitor), on the solder side of the board, connect pin 15 of the 4060 to the end of the resistor, then cut the track leading to/from pin 12.

SETTING THE FREQUENCY:

Connect a frequency counter to pin 9, buffered clock, and adjust to be correct, (xtal freq.), if your counter cannot read that high, set up on the lowest divider, this is pin 7 (crystal freq./16). Connect frequency counter to pin 7, and adjust trimmer so that it reads 153,600Hz, as accurately as you can get it. Even with a 6Hz error at 153,600 you should only be .1 Hz out at 2400Hz.

Bob Leggett

Colin Hall at the SDBS Conference, Baltimore USA June '88

With the start of the dreaded Autumn Term now well under way, retrospective analysis of GCSE results complete, mock examinations looming, and yet more exciting physics practical assessments piling up, and all under the ever-watchful eye of the Headmaster, I am beginning to wish I'd taken an extended leave of absence or gone A.W.O.L. in Baltimore - U.S.A.

My journey to the States began with a fun-flight in a twin engine Otter S.T.O.L. aircraft between Birmingham and Gatwick. An elderly couple, also bound for Gatwick looked slightly shocked as they were led to this "Biggles Hedgehopper" waiting on the tarmac, but all was well once they had received their parachutes, so it was chucks away (A familiar term to us Jet-setters) and we were away ! The Atlantic crossing was fairly uneventful, though I was disappointed to find that the bird was only a TriStar, instead of a 747 'Jumbo'. Serves me right for flying TWA instead of Virgin! Anyhow I took a few snaps with my Hasselblad (name dropper) just to impress the other passengers, but they were all to busy watching a boring floor show (to do with emergency evacuation procedures or something).

Clouds look really different viewed from above! Eventually we landed at Baltimore International Airport, and stepped into the heat. Apparently 85 degrees f. is quite cool out there, but to me it was like leaping into a fan - assisted oven ready to take the Sunday roast ! It did get much hotter, but thats another story ! (Signed pics of me in my beach shorts are available!) I was invited to spend a few days prior to the conference at the home of Helen E. Martin, a highly respected High School Teacher and user of Satellites in the class room, in the U.S.A. I soon experienced the warmth and amazing hospitality of the people of Pennsylvania, and am now addicted to maple syrup, french toast, and Danish pastries for breakfast!
To-gether with other guests at her home in West Grove P.A. I was able to visit the RCA plant at Valley Forge PA, and see some of the prestigious facilities used in the building and testing of civil and military weather satellites. Security was very tight, as the factory was involved in the Defence Meteorological Satellite Program.
They even took my Hasselblad away! I have it all on micro film , so anyone interested , you know where to contact me! (joking really)

Helen was also due to make a presentation at the Conference, jointly with Adrian Beaumont of the Frank Hooker School, Canterbury together with Students from both schools.

The Unionville High School Students were a bunch of great guys, full of fun with a wicked sense of adventure! They had a comprehensive range satellite equipment at the school, including the facility to receive and print "mufax" type images from the NOAA's, GOES and the Russian birds. It was not "state of the art" gear, indeed much of it was home brewed and "surplus " modified . I felt very much at home!

The conference was generally well organised, though I got a little concerned when I was calmly informed that a suitable projector for my Hasselblad 2 1/4" slides could not be found, but that they were still looking. I was "on" the next day ! Luckily I am fitted with slow - blow fuses, but these were really put to the test when it was announced that my 50 minute slot was reduced to 20 minutes. Eventually a projector was located, so I retired to rewrite my presentation and prune my lovely collection of 120 slides! I was assisted with lashings of Jack Daniels (a sort of cold tea!) I had already made the decision to dedicate my paper to John Tuke, one of the earliest amateurs to receive satellite images in the U.K. John was using home built equipment over 20 years ago and recording the early Essa and TIROS images.

His equipment was very primitive compared with what can be achieved to-day using Ic's. stepper motors. But it worked! For the record, John was receiving images at his home in Scotland well before Dundee University, and it was only after a visit from the University to John's home to see his own set-up, that Dundee got involved in satellite work. Anyway, after several slides illustrating the " Tuke" era, I went on to explain the development of micro-based satellite systems in the U.K. as used in the education sector. I used the images from Dartcom's Nimbus system (NIMSAT) to illustrate the excellent facilities and possibilities available to schools using a well designed hardware/software package, receiving APT or WEFAX imagery.

Slides of other suppliers micro based diplay systems were displayed for comparative purposes. Needless to say, the NIMSAT test card was the clear favourite in terms of accuracy and sharpness of detail. Obviously, as I made the point in Baltimore there is little point in trying to manipulate the data obtained from these satellites, if the test card reveals lost or corrupted data!

It's a great shame that representatives from Dartcom were not able to be present in person in Baltimore, as I am sure they would received an enthusiastic reception from amateurs, educationalists and professionals alike. Many thanks to Colin Opie at the rest of the Dartcom team in being so patient with me during my photographing sessions in Devon!

I concluded my presentation with a slide of my three Doberman mutts which caused great amusement. I had rather missed them during my stay in the U.S.A. and for the remainder of the conference I was continually quizzed as to the state of my "Dawgs" I think my presentation was quite well received, what with all my pretty images! Anyhow, as one of my proffs. once told me "If you can't impress them with facts, dazzle them with bull...." I suppose it was a little controversial, buts that me.

Some of the other technical presentations at the conference were first class, others less so. I enjoyed the presentation by Peter Baylis and co of Dundee University in the reception of Digital NOAA HRPT Data, and some of the others on AVHRR, but some sessions were extremely heavy! Pressure of work at present prevents me from commenting on the more technical aspects of some of the presentations, but when I receive my copy of the published proceedings of the conference, I hope to be able to make some more detailed observations.

In conclusion, I would like to express my sincere thanks to Helen Martin of the Unionville High School PTA., students Jeff, Robb and Dave for their unforgettable company during the conference week, and for taking me to see the film "Who Framed Roger Rabbit!" Thanks also to Bob Popham, Tom Potts and Jim Green of NOAA and Alberta Moran of creative Management Associates, and the many fellow satellite enthusiasts who made my visit such a memorable one!

Finally, I am indebted to the following for their financial support of this venture: British Aerospace Plc., British Telecom Education Service, Lucas Aerospace, The department of Education and science and last but not least, RIG.

Many thanks to you all for the opportunity of a life time!
PS Thanks Dave for looking after my "Dawgs"

Colin Hall.

Editors additional notes:
In case you are wondering, SDBS stands for Satellite Direct Broadcast Services. The conference was sponsored by NASA an NOAA.

The conference occurs every two years and this year they celebrated 25 years of 'Direct Readout'. I was lucky to arrange a business trip such that I was able to spend the first two days at the conference. I plan to make my own report in a future issue when time permits.

FAX ON THE FRAMESTORE - REVISITED.

Since my first notes about 2 years ago, I have not bothered to look at the HF fax transmissions as the reproduction was not very good, however with the modifications to the A/D that have appeared better results can be obtained. Reminder you need external sync circuit for this operation. Find a good non fading signal, Bracknell is probably the strongest and can be found on, 4782, 9203, 14436 kHz.

On 4782 with USB selected and careful tuning, excellent results can be obtained. If you have access to a 'scope then it is possible to tune very accurately. Connect the probe to pin 6 of the DAC0804, select 5 ms time base and .2V division/cm.

Make sure that a map is being transmitted, use the extension speaker or similar socket for the framestore connection and slowly tune through the signal.

When you hear a high pitched tone and the 'grating' noise, you should see a reasonably clear base line with 'spikes' appearing, corresponding to the 'grating' noise, gently rock the tuning from side to side so that you get the best amplitude of the spikes, and the base line stays and does not move upwards.

If you have a frequency meter but no 'scope, wait till the station has just finished transmitting, you should hear a steady tone, connect the frequency meter to the audio line, and tune to read about 3000 Hz, this will give you a good starting position, with only very small changes needed when a map is transmitted.

With the Dartcom A/D module fitted, adjust so that the peak black and white leds are flashing fairly steadily.

Magnification 1 on either Meteosat or NOAA positions will give good results, but bear in mind that you will not see all the width of the map, as some maps are over 17 inches wide.

The transmissions are sent to a timetable, my copy is dated 1969 priced at 12 shillings and sixpence !, it is called 'Handbook of Weather Messages' Part 1, Transmission Schedules and Station Index Numbers, The latest edition can be obtained from HMSO, High Holborn, London WC1.

Bob Leggett

COMPLAINTS THIS WAY:

The R.I.G. Newsletter has always carried advertisements for remote imaging products. We think this is a useful facility for members. Additionally, we try to provide objective reviews and assessments so that members can get some impression of the performance of products before decide to spend their money. Unfortunately we can't guarantee the quality of the products advertised or the effectiveness of any-after sales service that might be required.

Should any member encounter difficulties with a product advertised in the R.I.G. Magazine they should in the first instance approach the supplier. If, however, the supplier is unable or unwilling to provide a satisfactory solution to the problem then please let us know about it.

In order to co-ordinate things please call Stan Ames, see RIG Helplines for the number, and we will try to help you resolve the problem.

But, remember; tackle the supplier first and if its a serious problem do so in writing and keep copies of all correspondence.

Stan Ames

Editors footnote:

At least one of the advertisers has complained to me that members are calling them up to get advice on equipment supplied by other advertisers. This is not really fair. Members, in the first instance should contact the supplier concerned, ideally in writing (keeping a copy) and if that fails contact Stan above who has agreed to co-ordinate any complaints from the membership.

Price Maintenance:
As of 1st Jan 1989 all advertisers will be required to publish prices with all goods and services they may offer. Furthermore those prices must be maintained for the period of the magazine, ie until the next magazine comes out, hopefully 3 months later.
Finally because of problems in the past, all products must exist and be in stock at the time of placing the advert and for a reasonable time afterwards. ie No virtual hardware/software.

The Data Protection Act

Because the membership records of the Remote Imaging Group are held on a microcomputer, the Data Protection Act applies to us. For each member of the group, most of the information on the membership application form is stored, and the primary purpose of this data is of course for the production of the newsletter mailing labels.

Another use for this data is to help members get in touch with each other. For example, I can answer questions like "Who are all the framestore users in East Sussex?" and this information may be useful to a RIG member who wants to know more about framestores. But some RIG members do not want their names and addresses to be used in this way, and I respect this by marking the computer record with 'no publicity'. All records are marked thus unless the member has explicitly stated on the application form or by letter that he or she does not object to this form of publicity.

Because the Remote Imaging Group is an 'unincorporated members club', we are obliged to respect the wishes of those who do not want their membership details to be stored on a computer. There are a few members in this category at the moment, and if there are others who also have the same view, they should get in touch with me. For these members, all the processing of the membership record and the production of mailing labels has to be done by hand, and this makes my job a little more complicated. However, I should include a word of reassurance - if a member requests 'no publicity' then the computer-stored name and address details are only used for the production of newsletter mailing labels.

Des Watson

Eds Note

Can I ask members who elect to not have their details held on a computer to consider their decesion. The group is manned by voluntary staff and their spare time is at a premium. Without the personal computer this group and lot like it would not be able to function effectively. Clearly for each newsletter we have to produce handwritten address labels for such members and this is very time consuming. As Des says we do have some members in this category so please to those members please consider carefully before making the request.

The Russian and Chinese Satellite Scene

Les Currington G8LOK

With the late printing of the last RIG some of our members may have been confused and wonder what really is the position regarding transmissions from Russian and Chinese Satellites
Before giving the present summary as at 26.11.88 it is as well to remind new members that with the shortest day approaching the Meteors will not be heard at predicted time of AOS.; in fact while writing this report Meteor 2-17 did not switch until near Shetland Isles on a descending pass, with of course the exception of Meteor 3-02 when transmitting IR, more about that later.

It is perhaps as well to mention the intermittent quality of the Meteor transmissions. For some considerable time this series of satellites has been plagued with sync and automatic illumination control problems, all three Meteors now transmitting occasionally show severe streaking in the whites.
At first I thought it was possibly side band dipping in the receiver but this streaking has been proved to be on the transmission.
When free of trouble the pictures are of excellent quality and show their full potential when over snow covered ground.

Meteor 2-16 87.68 A 137.4 MHz

Meteor 2-16 is now in an early morning pass and will soon be in total darkness. It should be heard again on an late afternoon pass in January.

Meteor 2-17 88-05 137.3 MHz

Meteor 2-17 is transmitting on a south bound pass around mid day. Several reports have been received of edge code sticking and intermittent streaking, in spite of this we should see some excellent pictures of snow covered Europe in the next few weeks.

Meteor 3.02 88-64A 137.3-137.85 MHz

As reported in RIG 14 transmissions were received at the end of September and excellent IR and visible pictures were received especially during the period of Hurricane "Helene" when off the west coast of Scotland. An interesting feature of the IR is the fact that it using REVERSE IR, where white is hot and black is cold. Very interesting pictures were received during this period and is hoped to print one of them in future edition of the RIG newsletter.

Having wetted your appetite I have to report that no signals have been heard from Meteor 3-03 since mid October. Maybe we shall see more visible pictures when this satellite drifts into an early afternoon orbit in mid December, lets hope so.

CHINA FENG YUN 1988 - 80A. 137.034 & 137.79 MHz

After a spectacular start with excellent pictures received over a ten day period trouble appeared to set in and transmissions missions were then very intermittent and appeared to be switched on at random. Towards the end of October during the early morning mid atlantic orbit it was found to be suffering from severe fading , Geoff Perry of the Kettering group reports that optical observations showed that the satellite was tumbling and in major trouble.
First Transmissions from Feng Yun were on 137.79 and after several weeks changed to 137.034.

Okean 88-56 137.4

Very few transmissions have been heard from this satellite, all of which switched off after crossing the Arctic circle on an ascending orbit.

Cosmos 1766

Brief transmissions are still heard from this Oceanographic Satellite showing no data only piano keys.

KEPLER ELEMENTS provided by Max White
ROYAL GREENWICH OBSERVATORY, HERSTMONCEAUX CASTLE

	MET 3-1 137.85 MHz 85-100 A	MET 2-17 137.30 MHz 88-05 A	MET 30 136.97 MHz 80-51 A
EPOCH OF DATA	88324.12735818	88318.82457128	88325.76263489
ACCELERATION	0.00000043	0.00000141	0.00011112
REV NO	7884	653	6442
INCLINATION	82.5514	82.5403	97.6968
R. A. NODE	24.2731	91.6929	53.4525
ECCENTRICITY	0.0021173	0.0017336	0.0037889
ARG OF PERIGEE	103.9616	149.8242	198.4832
MEAN ANOMALY	256.3863	210.3917	161.4995
MEAN MOTION	13.16853123	13.84052033	15.01440301
SEMI MAJOR AXIS			

	COSMOS 1766 137.4 MHz 86-55 A	NOAA 11 137.62 MHz 88-89 A	NOAA 10 137.50 MHz 86-73 A
EPOCH OF DATA	88325.19785278	88321.44720132	88321.57284267
ACCELERATION	0.00002478	0.00000541	0.00000429
REV NO	12449	216	1680
INCLINATION	82.5266	98.9144	98.6653
R. A. NODE	230.9365	260.7955	349.9157
ECCENTRICITY	0.0025727	0.0013085	0.0014042
ARG OF PERIGEE	60.3894	110.9128	143.5564
MEAN ANOMALY	299.9862	249.3443	216.6573
MEAN MOTION	14.74037099	14.10681858	14.22682853
SEMI MAJOR AXIS			

	MET 2-15 137.85 MHz 87-1 A	MET 2-16 137.4 MHz 87-68 A	COSMOS 1869 137.4 MHz 87-62 A (Not updated)
EPOCH OF DATA	88319.46171613	88325.17663823	88269.22427583
ACCELERATION	0.00000124	-0.00000206	0.00001631
REV NO	2002	1835	6435
INCLINATION	82.4674	82.5601	82.5218
R. A. NODE	326.0021	25.1406	343.4130
ECCENTRICITY	0.0013652	0.0013016	0.0023081
ARG OF PERIGEE	137.2826	68.4095	313.9037
MEAN ANOMALY	222.9403	291.8486	46.0340
MEAN MOTION	13.83622926	13.83376904	14.73730349
SEMI MAJOR AXIS			

	OKEAN 137.4 MHz 88-56 A	MET 3-02 137.3 MHz 88-64 A	FENG YUN 137.04 MHz 88-80 A
EPOCH OF DATA	88325.73578582	88324.06522723	88314.48562690
ACCELERATION	0.00001138	0.00000391	0.00000507
REV NO	1724	734	439
INCLINATION	82.5170	82.5293	99.1472
R. A. NODE	329.1148	324.3061	282.7799
ECCENTRICITY	0.0023668	0.0016251	0.0014686
ARG OF PERIGEE	185.1568	345.8057	229.7156
MEAN ANOMALY	174.8980	14.2627	130.2722
MEAN MOTION	14.73554309	13.16845565	14.00713516
SEMI MAJOR AXIS			

	COSMOS 1602 137.33 MHz 84-105 A
EPOCH OF DATA	88323.64462230
ACCELERATION	0.00001958
REV NO	9337
INCLINATION	82.5393
R. A. NODE	172.5835
ECCENTRICITY	0.0026936
ARG OF PERIGEE	50.5190
MEAN ANOMALY	309.8393
MEAN MOTION	14.74244962
SEMI MAJOR AXIS	

INTERFACING THE FRAMESTORE TO THE SPECTRUM

For some time now I have had an interface which links the spectrum computer to my slow scan TV scan converter. This allows me to load up with pictures with resolution of 128x128 pixels into the Spectrum memory and print these out using a matrix of 4x4 dots to represent each pixel, thus giving a 16 level grey scale.

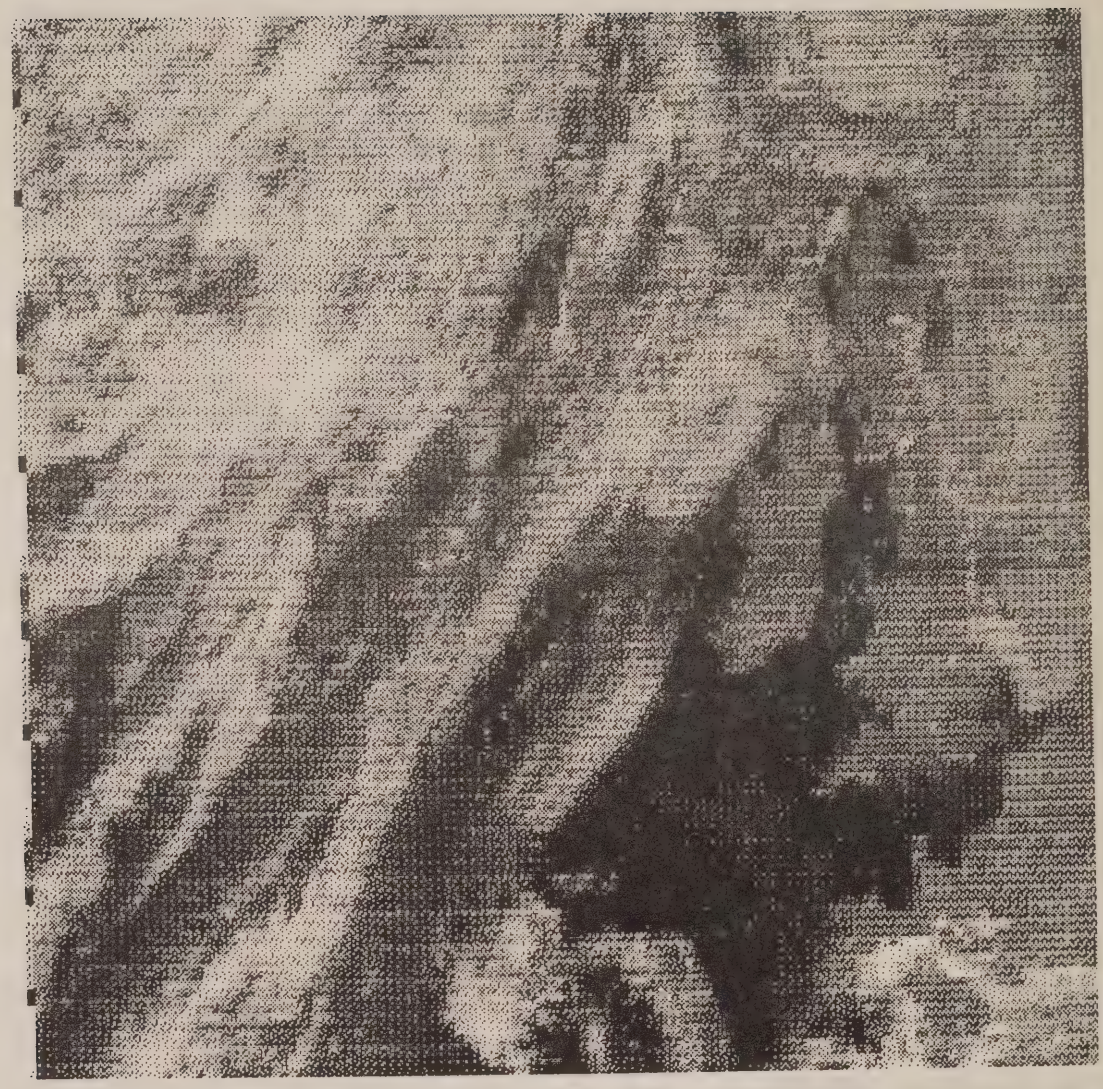
It occurred to me that I could use the same system to load the digitised video from the framestore board. This only requires 7 connections and a single input port is all that is needed. Four of the connections are the 4 most significant bits of the digitised video; next we must have a line sync pulse and a pulse for each of the pixels in the line. For this latter I have used the 'convert' pulse, and last of all there is the usual earth connection.

The computer does not have access to the contents of the framestore memory; the video is passed directly to the computer as it is received. The program 'WXPR' samples alternate lines and alternate pixels along the line, so clearly the pictures are of reduced definition and they have only 16 grey levels instead of the usual 64; nevertheless they give a good impression of cloud cover and on clear days the land is easily seen.

The program was written for a Spectrum equipped with a Disciple interface and disc drives for picture storage. It can be adapted to run with cassettes but a printer which is Epson compatible is essential and also an input port.

This program (on cassette) together with a PCB for the input and full notes can be purchased from me at a cost of 7 pounds including postage.

Grant Dixon
Kyrle's Cross
Peterstow
Ross-on-wye
Herefordshire HR9 6LD



June 14th 1988

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Membership Survey by Des Watson

In paying the 1988 subscription, most RIG members have completed a questionnaire. Here are some of the results from the analysis of the replies.
At the time of writing (September 1988), the group has a total of 1036 members. Of these, 52% are receiving signals from polar orbiters and 19% are receiving Meteosat. Approximately 25% of those members receiving satellite signals are experiencing some form of interference. In some of these cases, the problem is certainly very mild, but a surprisingly large number of replies indicated major interference, effectively preventing the use of the 136-138MHz band. I have a strong suspicion that the problem is not quite as severe as it was at the beginning of the year, but I do not have any quantitative evidence to support this supposition!

The most popular display device is the YU3UMV framestore. Of those specifying display equipment:

63% use the YU3UMV framestore
59% use a microcomputer
18% use 'normal' fax
2% use photographic fax
9% use other types of framestore.

The sum is greater than 100% since many members use more than one display device.

13% of the membership is employed in education and 6% stated that they were equipment manufacturers or professional users. The use of satellites in education is becoming increasingly important and this is reflected in the numbers of schools and colleges joining RIG.

The questions relating to which computer is used for weather satellite work yielded a huge range of answers from Crays and other supercomputers at one end to the ZX81's (no offence intended!) at the other. The survey showed that:

36% use BBC machines (B, B+, Master etc.)
7% use IBM PC's or clones
7% use Spectrums
3% use Ataris
3% use Commodores
10% use other machines.

Despite my promises, I have not yet produced a map indicating the distribution of RIG members by county. I'll do it soon, I promise!

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2.SEPT.1988 Eumetsat Bulletin

This EUMETSAT bulletin has arrived via packet through DF5DU, G8FAT and a host of others, it contains some useful info on the Meteosat 3 aerial problems - many thanks to all concerned, Ed.

After having been successfully launched on 15 June 1988 Meteosat-3 is now station in geostationary orbit over the gulf of Guinea. Since the 11th August the satellite has supported all Meteosat missions.

Unfortunately during the initial check-out of the satellite a problem with the electronically despun antennae (EDA) was discovered which effects S-band image dissemination Transmissions from the spacecraft.

The Meteosat EDA consists of 32 columns of four dipole elements each. These columns of dipoles are energised successively in the direction opposite to satellite spin thus directing the radiated energy in the direction of the earth.

Four of these columns of dipoles are energised simultaneously at any one time.

At the beginning of July it was discovered that one of the antenna dipole columns was not energised. All S-band signals transmitted via the EDA were affected by signal drop of approximately 3DB during the time period when this antenna column should have been active, i.e. during 1/8 of each spin period.

A second column was reported failing on the 12th August and a third similar failure was detected on the 19th August. Fortunately the defective columns are not in close proximity to each other but are fairly uniformly distributed around the EDA drum. As a result of this failure there are cyclic power reductions in all S-band downlink signals during 3/8 of each spin period. Due to fact that there are no groups of neighbouring antenna columns affected at the present time. The maximum signal drop is always 3db.

The link budgets of Meteosat-3 have been calculated and it has been determined that during the periods of signal reduction there is still a margin of + 1.8 db (dissemination channel 1 = 1694.5 Mhz) and - 0.5 db (dissemination channel 2 = 1691.0 Mhz) at the edges of the Meteosat telecommunications coverage area.

This implies that the degraded performance of both dissemination channels should not cause problems to pdus and sdus designed according to specification.

ESA, in co-operation with the spacecraft manufacturers, is currently investigating possible causes of the malfunction and the probability of error and propagation. Although the performance of Meteosat-3 is still acceptable, EUMETSAT is considering alternative operations concepts with ESA in order to cope with any further failure of the EDA.

If the situation arose whereby several adjacent columns of dipoles were affected then the power drop would be much higher and normal dissemination operations could not be continued.

The presently considered concepts for failure mode operations forsee the use of Meteosat-3 for image acquisition and operation of the DCP mission via its toroidal pattern antenna (TPA), which is mounted on top of EDA unfortunately, this mode of operation would not allow simultaneous image dissemination transmissions from the spacecraft.

In order to be prepared for any possible further failure of the EDA the drift of Meteosat-2 was stopped on the 29th August.
On that date the satellite's position was approximately 2.6 degrees West.
The spacecraft then began to move slowly eastwards because of natural drift.
Due to the high orbit inclination of Meteosat-2 (approximately 1.6 degrees), the reception of image data from this satellite by PDUS users with large antennae would once more be periodically affected each day.

It might therefore be necessary to consider either splitting wefax and high resolution transmissions between Meteosat-2 and 3, or operating a time shared mission comprising
raw image acquisition and image dissemination via Meteosat-3.
We will keep you informed of any further degradation in the performance of the satellite and of developments with the generation of failure mode operating scenarios.

73 DE DF5DU, KLAUS.

PICTURE DISTORTION DUE TO SATELLITE MOTION

A polar orbiting satellite is moving quite fast (about 250 miles per minute) and this produces a slight distortion of the picture.

This form of distortion is shown in Figure 1. Briefly, the sides of the picture, which should be straight, are slightly bowed. This distortion can be measured and put to good use.

For all but the most accurate measurements, the orbit of a polar orbiting satellite may be taken as a circle, and its speed constant. The earth may be taken as spherical with a radius of 6378 km. The height of the satellite is between 800km and 860km.

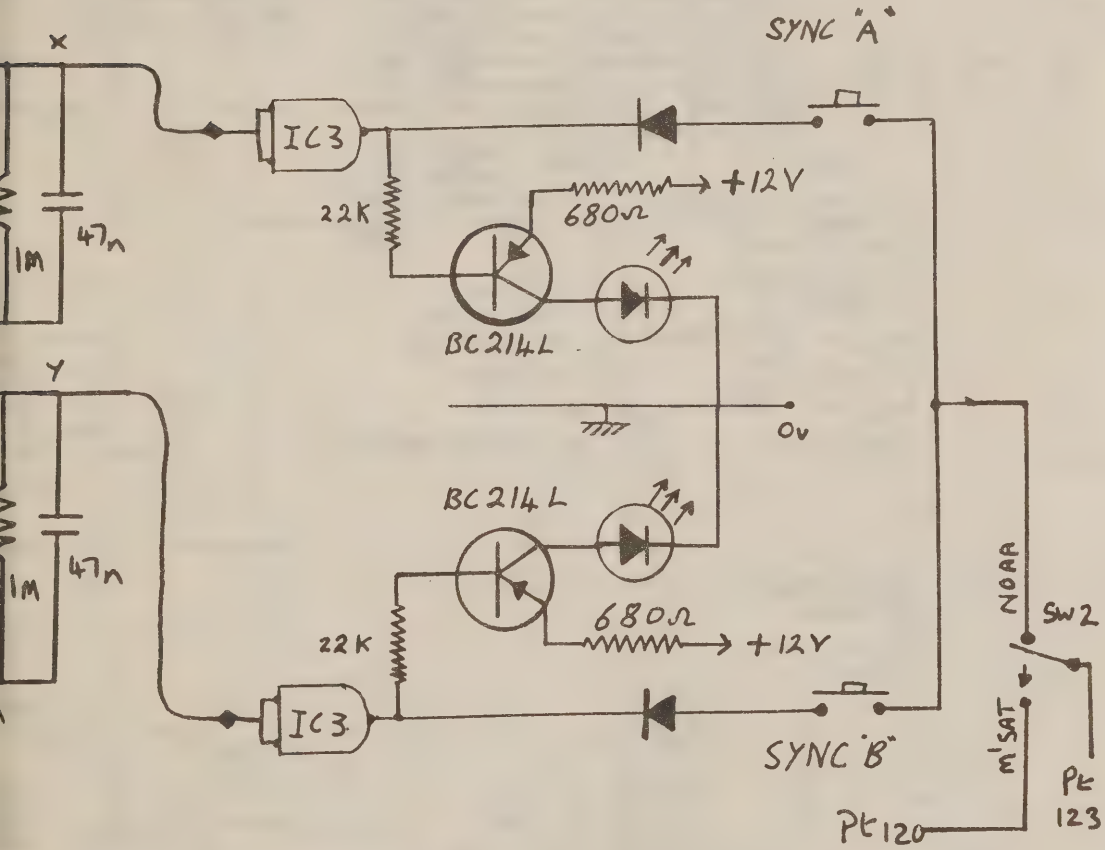
Consider the case of an orbit which goes directly over the observers head. When a satellite first appears over the horizon it is about 3420km from the observer (see figure 2). Radio signals travel at the speed of light (300000km per second) Hence the signal takes 3420/300000 = .011 seconds to reach the observer.

Because the satellite is moving towards the observer, the next line to be sent (0.5 seconds later) has a shorter distance to travel and thus takes less time to reach the receiving station. Hence the receiving station receives newlines at intervals of slightly less than 0.5 seconds and the difference accumulates.

A few minutes later, when the satellite is directly above the receiver, the signal takes 860/300000 = .0029 seconds to reach the observer. The time between successive lines will appear slightly less than 0.5 seconds as the satellite is approaching and slightly more when the satellite is moving away. This time difference makes the display show successive lines slightly displaced relative to each other so that the telemetry lines marking marking the edge of the picture will be slightly bowed.

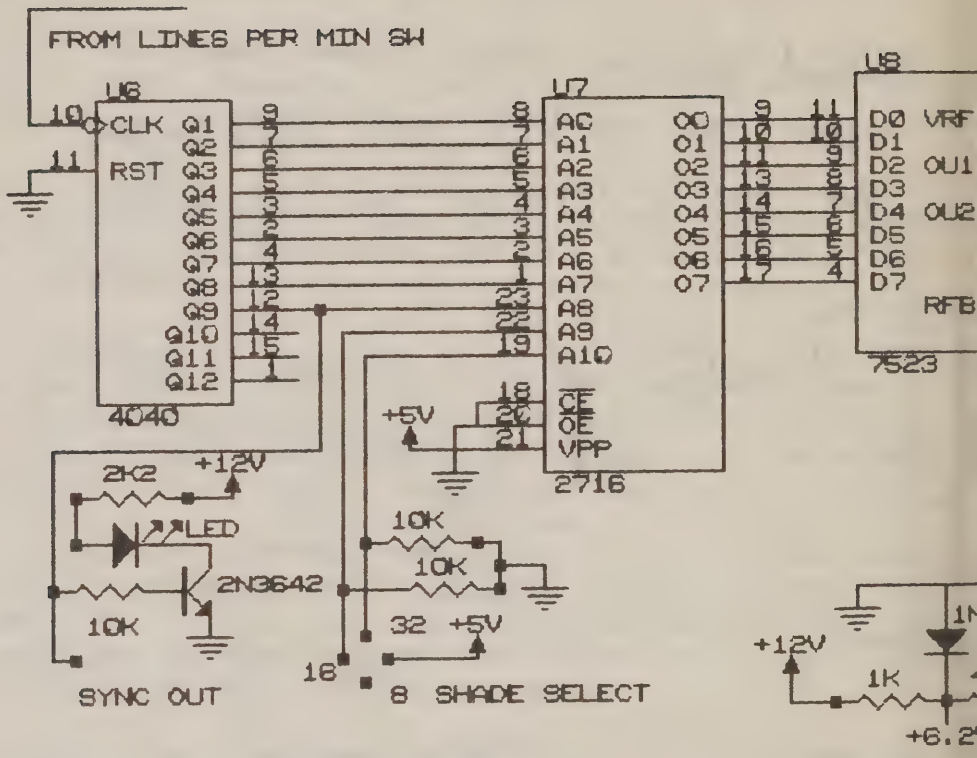
The maximum displacement will be (.011-.0029) /0.5 parts of a line ie about half the width of the synchronisation pattern on the side of each picture. My system uses a crystal oscillator to measure the time between successive lines.
Systems that use the 2.4kHz signal as the primary timing signal do not have this distortion but my system can never do this because of the local noise levels. For passes which do not pass directly over head the distortion is less.
This phenomenon also causes a change in pitch of a police siren as a police car drives past and is referred to as the Doppler effect.

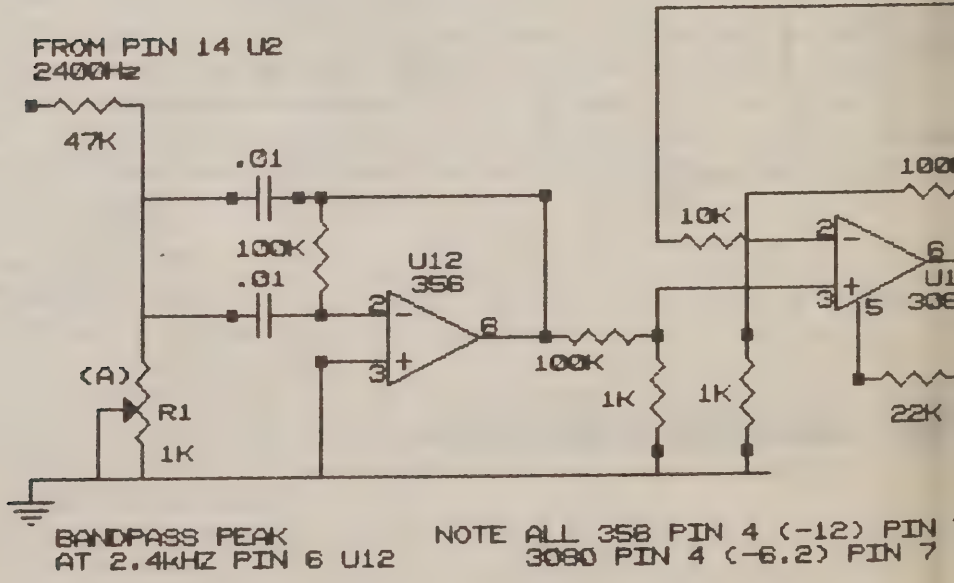
Unused gates on IC3 should have their inputs (Pins 5 & 6) (Pins 8,9) Shorted together and taken to +ve rail via 1KΩ resistors

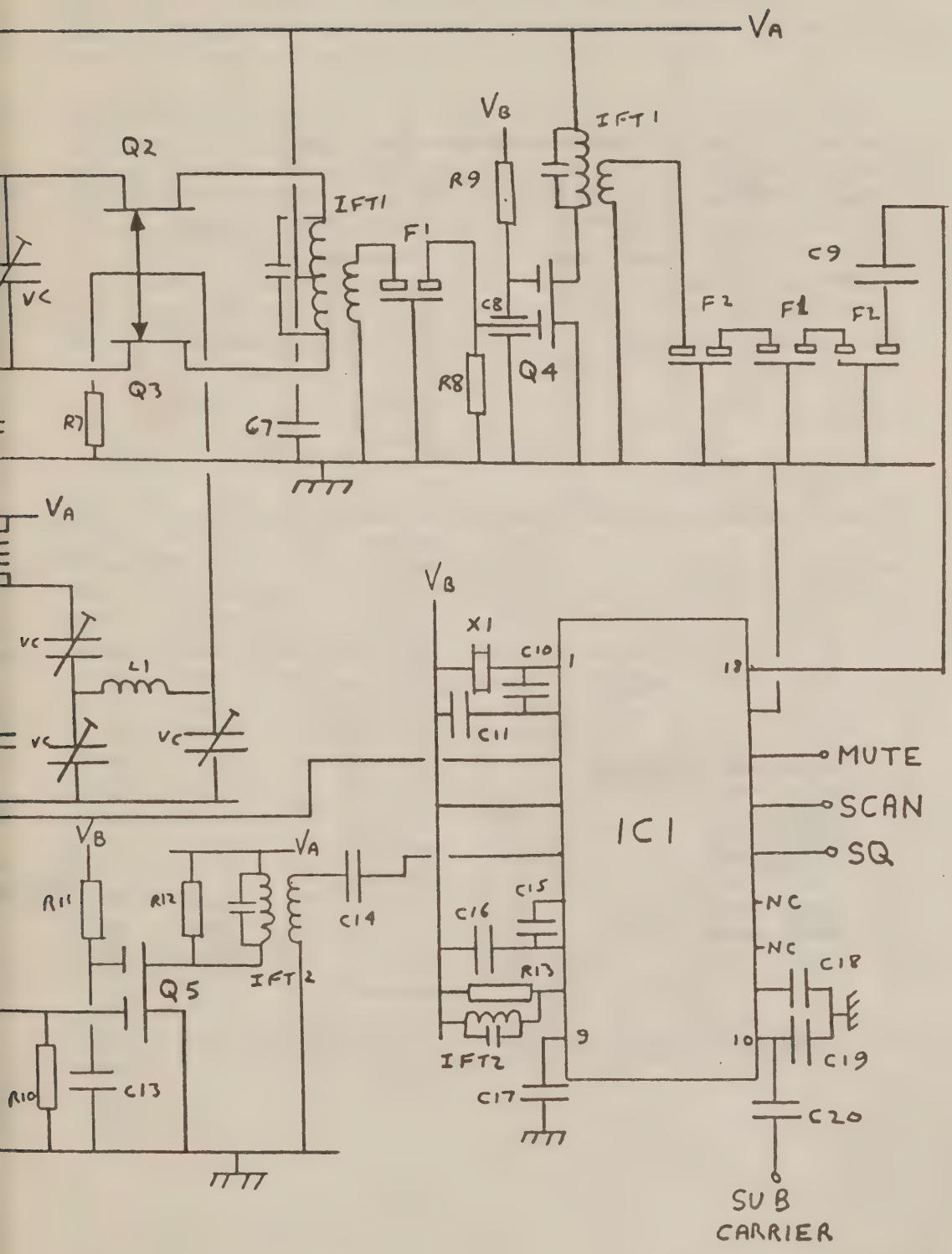


AGE SELECTOR – G8LOK.

GREYSCALE GENERATOR CIRCUIT






VA
VB
Q2
IFT1
R9
IFT1
F1
C9
VC
C8
F2
F1
F2
Q4
R8
Q3
R7
C7
VA
VB
X1
C10
1
18
VC
L1
C11
MUTE
VC
VC
SCAN
IC1
SQ
VB
VA
R11
R12
C15
C14
C16
NC
NC
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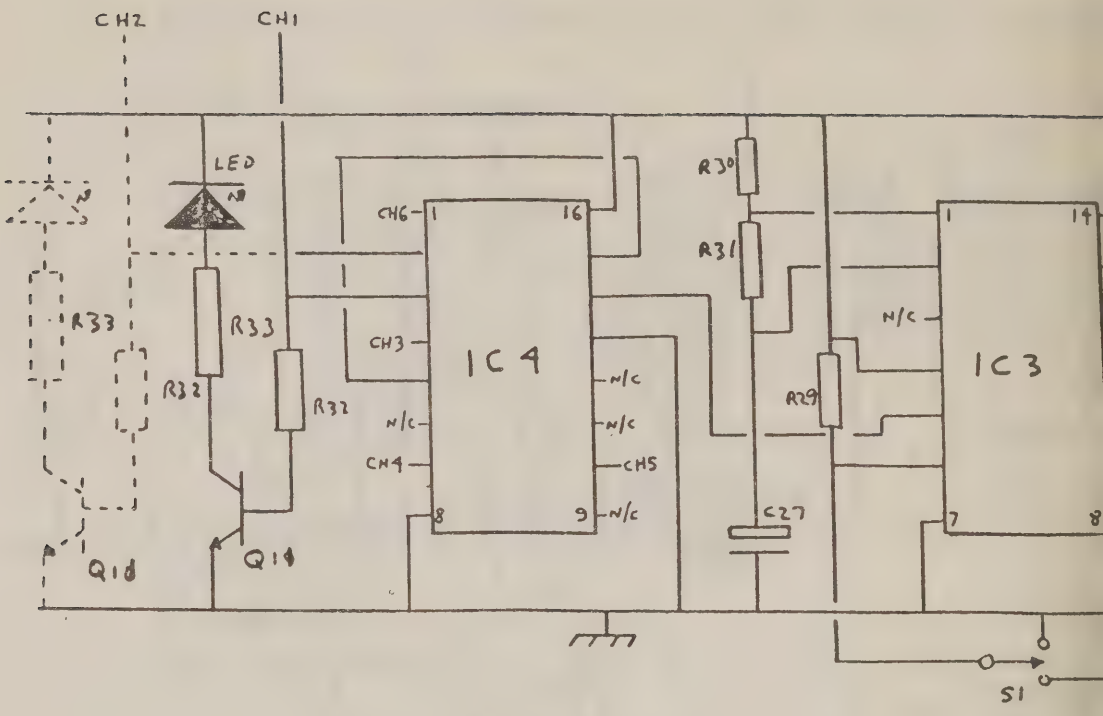
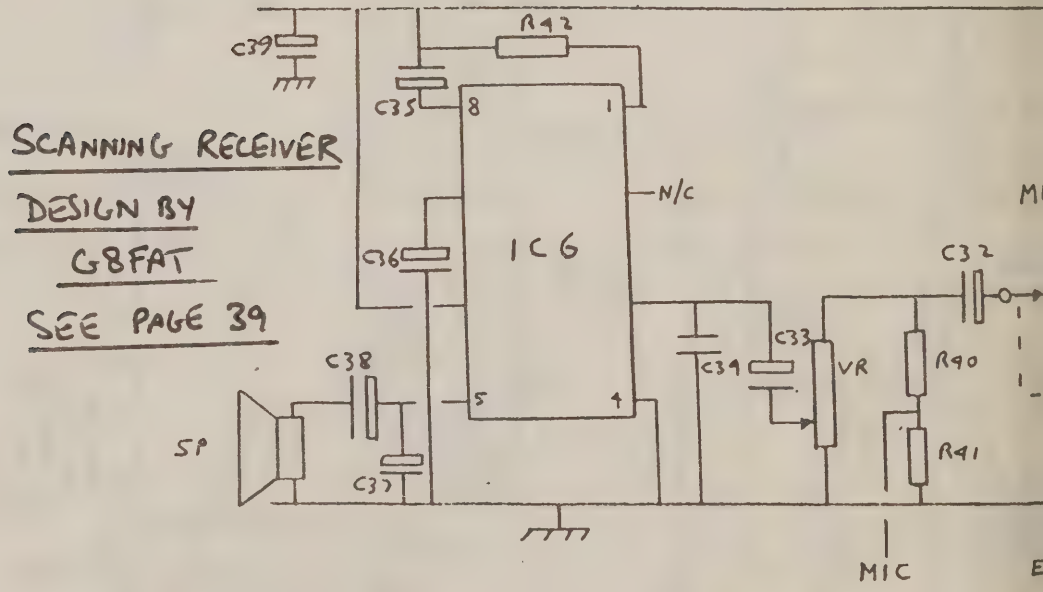
R13
Q5
IFT2
9
10
C19
IFT2
R10
C13
C17
C20
SUB
CARRIER





SCANNING RECEIVER

DESIGN BY

G8FAT

SEE PAGE 39

Reference Orbits for Russian Satellites

These are the times of North-going equator crossings (in GMT) and longitudes (in degrees West) for three Russian satellites.
They are given at weekly intervals together with the period and the change in longitude per orbit.

Ed's note:
Note that the typical Russian satellite orbit is not sun synchronous and are also not retrograde. Look at the inclination values in the Keplers. The Russians are typically 82 degrees (ie northbound pass travels NNEasterly direction) whereas the NOAA's inclination figure is typically 98 degrees (ie north bound pass is in a NNWesterly direction). All this means is that for an overhead pass the Russian predictions need an equator crossing value (EQX) of 0 to 10 degrees whereas the NOAA's need a typical EQX value of about 345 - 355 degrees.

Met 2-16 137.4 MHz		
Period 104.158 mins.		
incm. 26.21 degrees		
20 Dec	16:48	340
27 Dec	17:10	359
4 Jan	16.07	357
11 Jan	16:30	15
18 Jan	15:09	7
25 Jan	13:48	359
1 Feb	14.10	17
8 Feb	12:49	9
15 Feb	11:28	1
22 Feb	11:51	20
1 Mar	10:30	12
8 Mar	9:08	4
15 Mar	7:47	356

Met 3-02 137.3 MHz		
Period 109.413 mins.		
incrm 27.46 degrees		
20 Dec	12:29	334
27 Dec	14:04	10
4 Jan	13.32	16
11 Jan	11:29	357
18 Jan	11:15	5
25 Jan	11:00	13
1 Feb	8.57	354
8 Feb	8:42	23
15 Feb	8:28	11
22 Feb	8:14	19
1 Mar	6:10	0
8 Mar	5:56	8
15 Mar	5:42	16

Met 2-17 137.3 MHz		
Period 104.103 mins.		
incrm. 26.19 degrees		
20 Dec	21:52	355
27 Dec	22:10	12
4 Jan	21.00	9
11 Jan	19:33	0
18 Jan	19:52	17
25 Jan	18:26	8
1 Feb	17.00	358
8 Feb	17:18	16
15 Feb	15:51	6
22 Feb	14:25	357
1 Mar	14:43	14
8 Mar	13:17	5
15 Mar	11:50	356

Original data supplied by Dick Boardman and modified by Henry Neale.

NOAA '10' PERIOD 101.2760995730061 MINS
INCR 25.31919530869348 DEG

20/12	185	07:57	19/01	196	08:41	16/02	345	18:37	19/03	199	08:52
21/12	179	07:34	20/01	191	08:19	17/02	188	08:07	20/03	193	08:30
22/12	174	07:12	20/01	342	18:27	18/02	182	07:45	20/03	345	18:38
22/12	199	08:54	21/01	185	07:57	19/02	177	07:23	21/03	188	08:08
23/12	194	08:31	22/01	179	07:35	20/02	196	08:42	21/03	340	18:15
23/12	345	18:39	23/01	174	07:13	21/02	191	08:20	22/03	182	07:46
24/12	188	08:09	23/01	199	08:54	21/02	343	18:28	23/03	177	07:24
24/12	340	18:17	24/01	194	08:32	22/02	185	07:58	24/03	197	08:43
25/12	182	07:47	24/01	346	18:40	23/02	180	07:36	25/03	191	08:21
26/12	177	07:25	25/01	188	08:10	24/02	174	07:14	25/03	343	18:28
27/12	197	08:44	25/01	340	18:18	25/02	194	08:33	26/03	185	07:58
28/12	191	08:22	26/01	183	07:48	25/02	346	18:40	27/03	180	07:36
28/12	343	18:30	27/01	177	07:26	26/02	188	08:11	28/03	174	07:14
29/12	186	08:00	28/01	172	07:03	26/02	340	18:18	29/03	194	08:33
30/12	180	07:38	28/01	197	08:45	27/02	183	07:48	29/03	346	18:41
31/12	175	07:16	29/01	191	08:23	28/02	177	07:26	30/03	189	08:11
1/01	194	08:35	29/01	343	18:30	1/03	172	07:04	30/03	341	18:19
1/01	346	18:42	30/01	186	08:01	1/03	197	08:45	31/03	183	07:49
2/01	189	08:13	31/01	180	07:38	2/03	192	08:23	1/04	178	07:27
2/01	341	18:20	1/02	175	07:16	2/03	344	18:31	2/04	172	07:05
3/01	183	07:50	2/02	195	08:35	3/03	186	08:01	2/04	197	08:46
4/01	178	07:28	2/02	347	18:43	4/03	181	07:39	3/04	192	08:24
5/01	172	07:06	3/02	189	08:13	5/03	175	07:17	3/04	344	18:32
5/01	198	08:47	3/02	341	18:21	6/03	195	08:36	4/04	186	08:02
6/01	192	08:25	4/02	184	07:51	6/03	347	18:44	5/04	181	07:40
6/01	344	18:33	5/02	178	07:29	7/03	189	08:14	6/04	175	07:17
7/01	186	08:03	6/02	172	07:07	7/03	341	18:22	7/04	195	08:37
8/01	181	07:41	6/02	198	08:48	8/03	184	07:52	7/04	347	18:44
9/01	175	07:19	7/02	192	08:26	9/03	178	07:30	8/04	190	08:15
10/01	195	08:38	7/02	344	18:34	10/03	173	07:07	8/04	341	18:22
10/01	347	18:46	8/02	187	08:04	10/03	198	08:49	9/04	184	07:52
11/01	190	08:16	9/02	181	07:42	11/03	192	08:27	10/04	178	07:30
11/01	342	18:24	10/02	176	07:20	11/03	344	18:34	11/04	173	07:08
12/01	184	07:54	11/02	195	08:39	12/03	187	08:04	11/04	198	08:49
13/01	179	07:32	11/02	347	18:46	13/03	181	07:42	12/04	193	08:27
14/01	173	07:10	12/02	190	08:17	14/03	176	07:20	12/04	345	18:35
14/01	198	08:51	12/02	342	18:24	15/03	196	08:39	13/04	187	08:05
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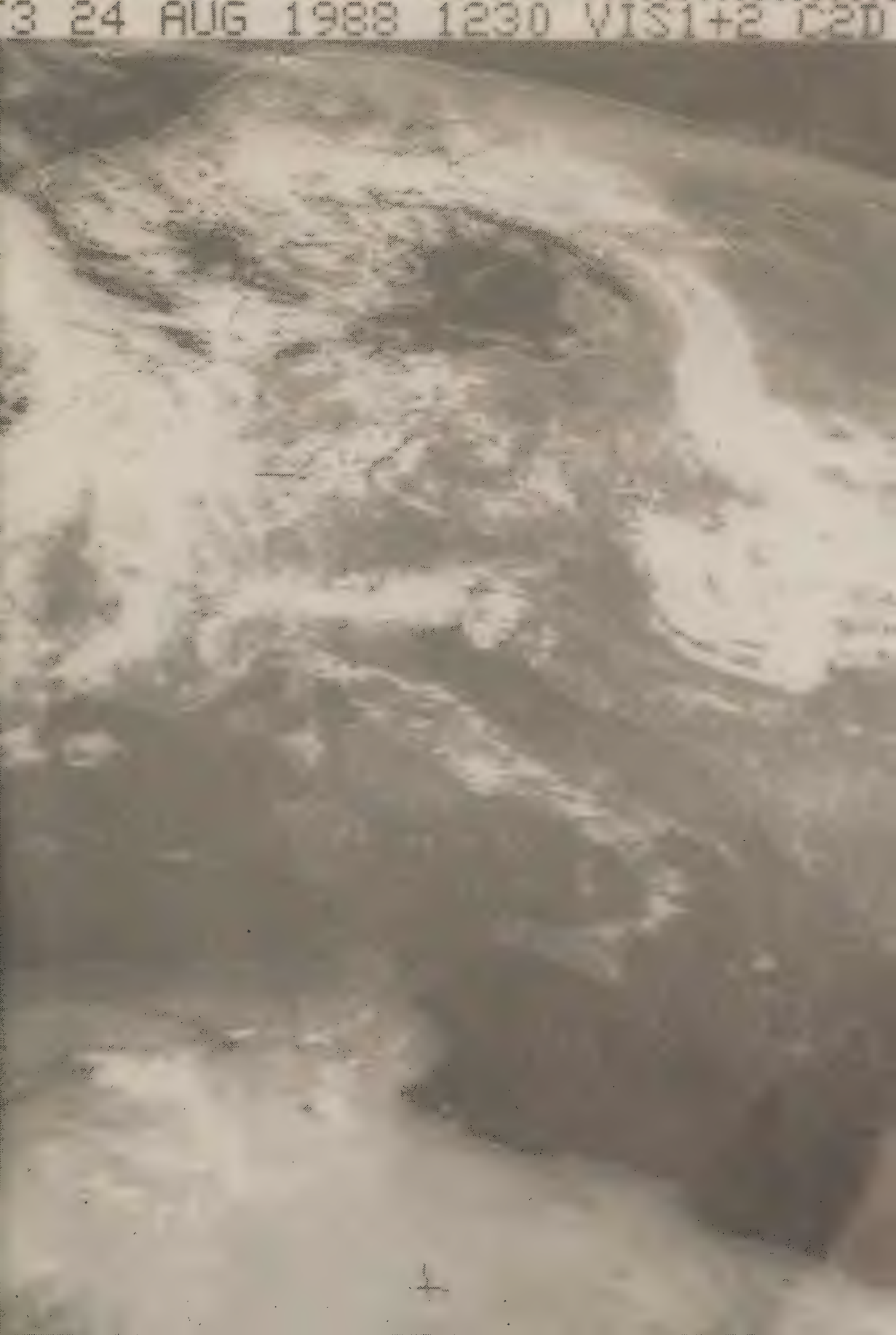
15/01	345	18:36	14/02	179	07:32	16/03	342	18:25	15/04	176	07:21
16/01	187	08:07	15/02	173	07:10	17/03	185	07:55	16/04	196	08:40
17/01	182	07:44	15/02	199	08:51	18/03	179	07:33	17/04	190	08:18
18/01	176	07:22	16/02	193	08:29	19/03	174	07:11	17/04	342	18:26

All morning passes are southbound, evening passes are northbound.
Frequency 137.50MHz. INCRement is degrees change per orbit.


3 24 AUG 1988 1230 VIS1+2 CAD

RIG SUBSCRIPTION 1989

Your subscription to the REMOTE IMAGING GROUP now falls due for renewal.

If you wish to continue to be a member of the group and receive the newsletter then please complete the form below not forgetting to sign the declaration and send it to Des Watson our membership secretary whose address is below.

The fees for 1989 are as follows:

U.K. membership		£5.00
European membership	(£5.00 + £1.50 post)	£6.50
Outside Europe	(£5.00 + £2.50 post)	£7.50

(All non U.K. post will be sent by air mail)

Send your completed form (including the completed survey) to:

Mr. Des Watson, SUBS 89
Norton,
Gote Lane,
Ringmer,
Near Lewes,
East Sussex, BN8 5HX
ENGLAND

NAME: _____ CALL SIGN _____

ADDRESS: _____

_____

_____ POST CODE _____

DECLARATION:

I do not object to the Remote Imaging Group holding my membership details on a computer.

Signed _____ Date _____

When writing in to the group please use your callsign if you have one. Finally if you have recently paid your 1989 sub then please disregard this notice.

MEMBERSHIP SURVEY - DECEMBER 88

In order to understand what the members of the RIG are currently interested in we have compiled the questions below which we hope all members renewing their subscription will complete. Please feel free to add any futher comments or suggestions on the reverse side of the survey form. Particularly, on the much discussed interference problem. Please tell us if your local levels of interference have reduced, we suspect that in certain areas that this is the case.

Yes/No

1 Are you currently receiving weather satellite signals? ___

2 Are you receiving polar orbiters, NOAA's Meteor's etc ? ___

3 Are you receiving Meteosat III ? ___

4 Are you professionally involved:
in education ? ___ equipment manufacturer ? ___
professional user ? ___ other, please specify overleaf ___

5 What display equipment do you use: Photographic fax ? ___

normal fax ? ___ micro computer ? ___ YU3 framestore? ___

6 Do you use a micro computer for weather satellite work? ___

Applications: Predictions: _____ Imaging? ___

Which one?: BBC micro ___ Sinclair Spectrum ___
IBM PC ___ Apple ___
State model Commodore ___ Atari ___
please Nimbus ___ Other please specify
_____

7 For U.K. members only
Do you object to your name and address details
a) being held on a computer? ___

b) being given to the DTI for blanket licensing approval ___

c) being given to RIG members in your vicinity ___

8 Do you suffer from the interference in the weather satellite band? ___
If yes then is it

Worse? ____ Better? ____ No Change? ___

NOAA '11' PERIOD 102.1349591937866 MINS
INCR 25.53329910441929 DEG

20/12	331	11:48	19/01	332	11:51	17/02	182	01:52	19/03	182	01:55
21/12	354	13:20	20/01	355	13:23	17/02	335	12:04	19/03	336	12:08
22/12	352	13:10	21/01	352	13:13	18/02	333	11:54	20/03	333	11:57
23/12	349	13:00	22/01	350	13:03	19/02	330	11:44	21/03	331	11:47
24/12	347	12:50	23/01	347	12:53	20/02	353	13:16	22/03	354	13:19
25/12	344	12:40	24/01	345	12:43	21/02	350	13:06	23/03	351	13:09
26/12	189	02:17	25/01	189	02:20	22/02	348	12:56	24/03	349	12:59
26/12	342	12:30	25/01	342	12:33	23/02	345	12:46	25/03	346	12:49
27/12	186	02:07	26/01	187	02:10	24/02	190	02:23	26/03	190	02:26
27/12	339	12:20	26/01	340	12:23	24/02	343	12:36	26/03	343	12:39
28/12	183	01:57	27/01	184	02:00	25/02	187	02:13	27/03	188	02:16
28/12	337	12:09	27/01	337	12:13	25/02	340	12:26	27/03	341	12:29
29/12	181	01:47	28/01	181	01:50	26/02	185	02:03	28/03	185	02:06
29/12	334	11:59	28/01	335	12:02	26/02	338	12:16	28/03	338	12:19
30/12	332	11:49	29/01	332	11:52	27/02	182	01:53	29/03	183	01:56
31/12	355	13:21	30/01	330	11:42	27/02	335	12:06	29/03	336	12:09
1/01	352	13:11	30/01	355	13:24	28/02	333	11:55	30/03	333	11:58
2/01	350	13:01	31/01	353	13:14	1/03	330	11:45	31/03	331	11:48
3/01	347	12:51	1/02	350	13:04	2/03	353	13:17	1/04	354	13:20
4/01	344	12:41	2/02	348	12:54	3/03	351	13:07	2/04	351	13:10
5/01	189	02:18	3/02	345	12:44	4/03	348	12:57	3/04	349	13:00
5/01	342	12:31	4/02	189	02:21	5/03	346	12:47	4/04	346	12:50
6/01	186	02:08	4/02	342	12:34	6/03	190	02:24	5/04	190	02:27
6/01	339	12:21	5/02	187	02:11	6/03	343	12:37	5/04	344	12:40
7/01	184	01:58	5/02	340	12:24	7/03	187	02:14	6/04	188	02:17
7/01	337	12:10	6/02	184	02:01	7/03	341	12:27	6/04	341	12:30
8/01	181	01:48	6/02	337	12:14	8/03	185	02:04	7/04	185	02:07
8/01	334	12:00	7/02	182	01:51	8/03	338	12:17	7/04	339	12:20
9/01	332	11:50	7/02	335	12:03	9/03	182	01:54	8/04	183	01:57
10/01	355	13:22	8/02	332	11:53	9/03	335	12:07	8/04	336	12:10
11/01	352	13:12	9/02	330	11:43	10/03	333	11:56	9/04	334	12:00
12/01	350	13:02	9/02	355	13:25	11/03	330	11:46	10/04	331	11:49
13/01	347	12:52	10/02	353	13:15	12/03	353	13:18	11/04	354	13:21
14/01	345	12:42	11/02	350	13:05	13/03	351	13:08	12/04	351	13:11
15/01	189	02:19	12/02	348	12:55	14/03	348	12:58	13/04	349	13:01
15/01	342	12:32	13/02	345	12:45	15/03	346	12:48	14/04	346	12:51
16/01	186	02:09	14/02	189	02:22	16/03	190	02:25	15/04	344	12:41
16/01	340	12:22	14/02	343	12:35	16/03	343	12:38	16/04	188	02:18
17/01	184	01:59	15/02	187	02:12	17/03	188	02:15	16/04	341	12:31
17/01	337	12:11	15/02	340	12:25	17/03	341	12:28	17/04	186	02:08
18/01	181	01:49	16/02	184	02:02	18/03	185	02:05	17/04	339	12:21
18/01	334	12:01	16/02	338	12:15	18/03	338	12:18	18/04	183	01:58

All morning passes are southbound, afternoon passes are northbound.

Frequency 137.62MHz. INCRement is degrees change per orbit.

VHF communications

A Publication for the Radio Amateur
Especially Covering VHF, UHF, and Microwaves

VHF Communications - UK Agent

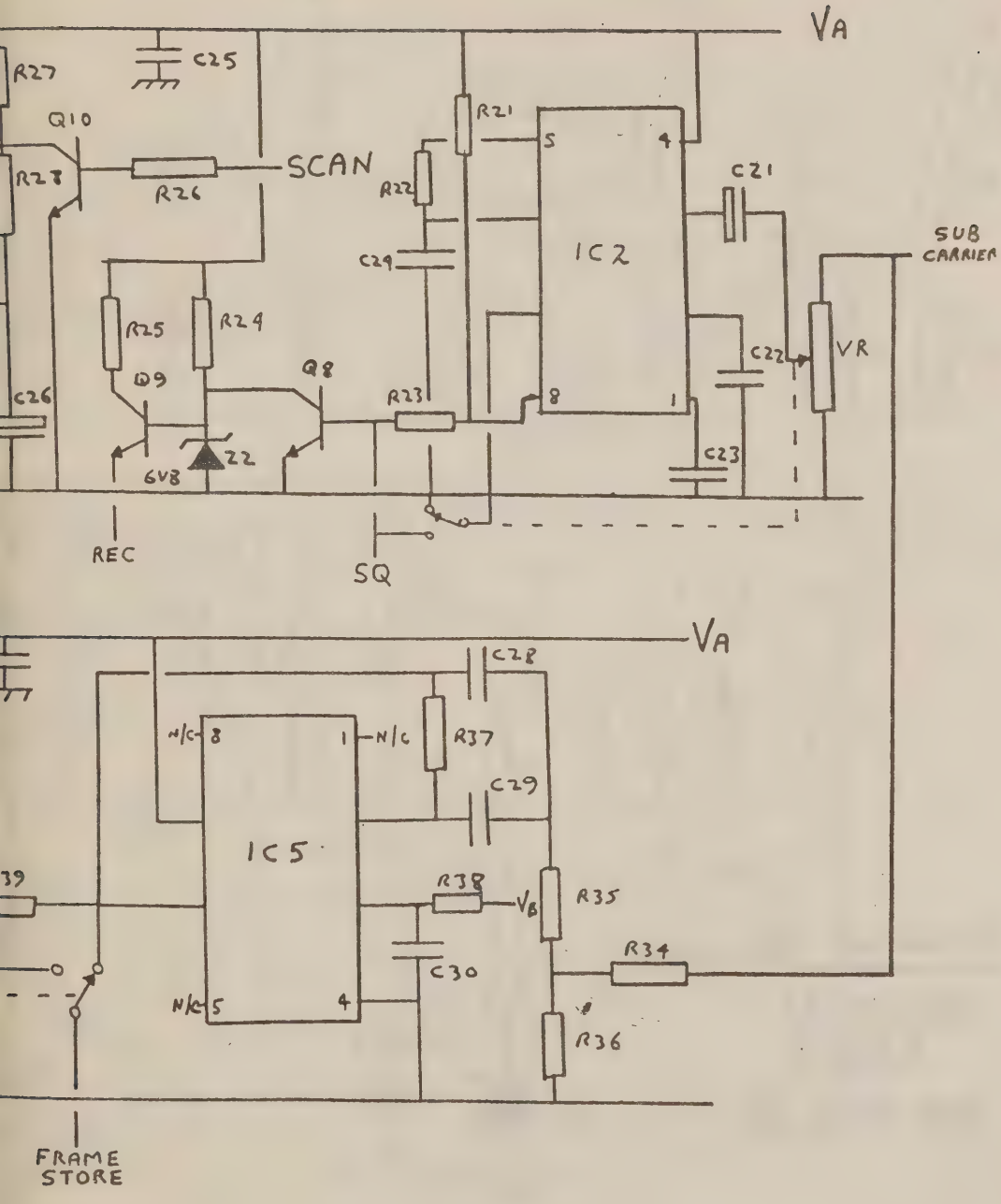
I suspect that many members may be unaware of a most excellent German Magazine which is available reprinted in English. The magazine caters for the technically minded radio amateur and covers the VHF frequencies and upwards. Apart from radio communications the magazine deals with amateur television and recently Satellite TV reception. The magazine also has had along running interest in Weather satellite reception and display of images. The magazine covered the YU3UMV framestore back in 1982/83.
Subsequent editions dealt with modifications and especially a multi-image enhancement which allowed the sequenced display of up to 5 or 10 Meteosat images.

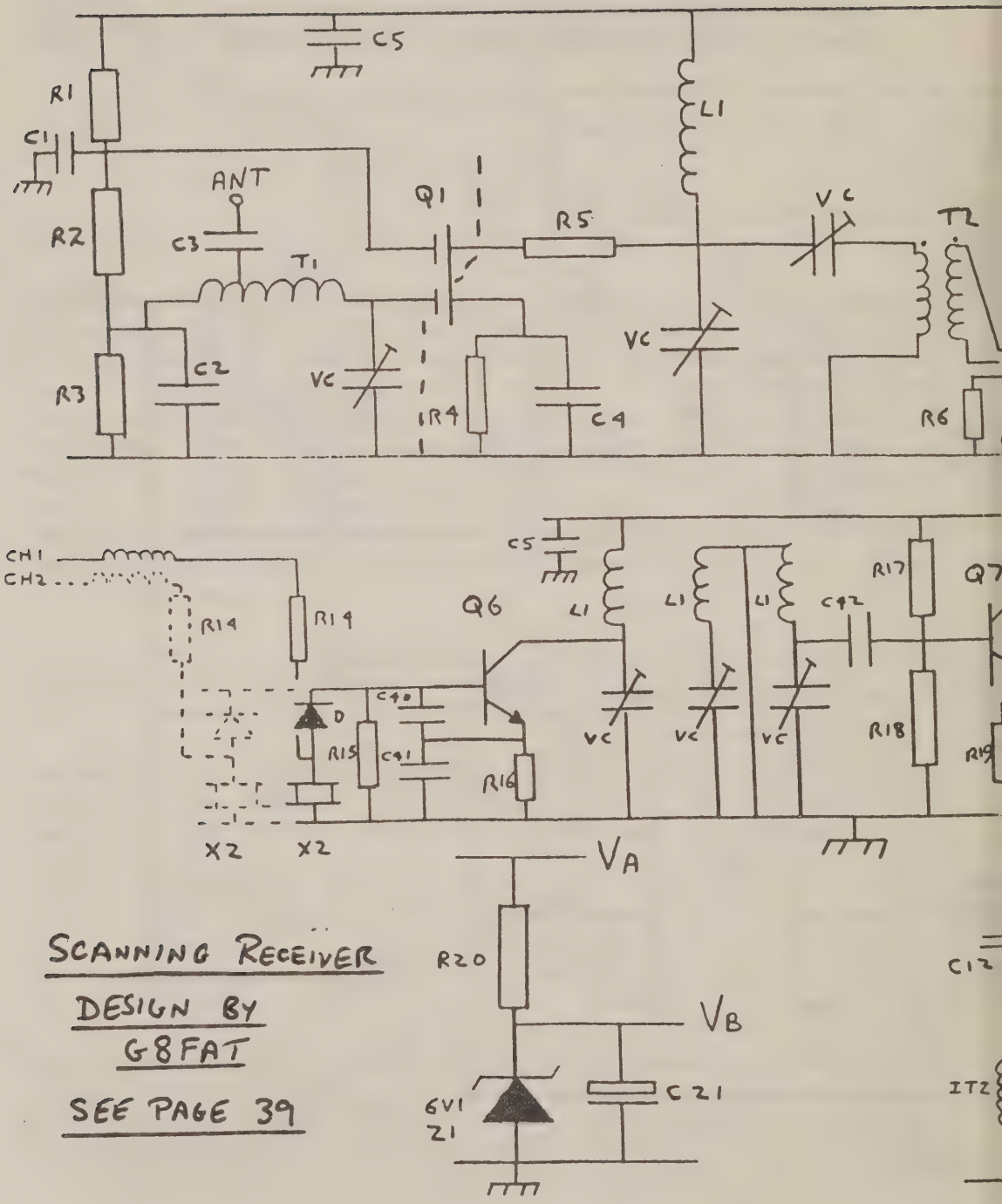
The magazine also provides full or partial kits to support the published projects which can be ordered directly from Germany. The use of Access and Visa card greatly simplifies this operation.

The magazine is published 4 times a year, a little behind the German edition. The subs are £9.50 per year. The UK now has a representative through whom subscriptions and kit orders may be sent:

Mike Wooding G6IQM
5 Ware Orchard
Barby
Near Rugby
CV23 8UF

Mike is the assistant editor of CQ-TV, the journal of the British Amateur TV Club (BATC). You can call Mike on 0788 890365 at sensible hours, 6.30pm - 9.30pm weekdays and after 11am at weekends, please mention RIG when contacting him.

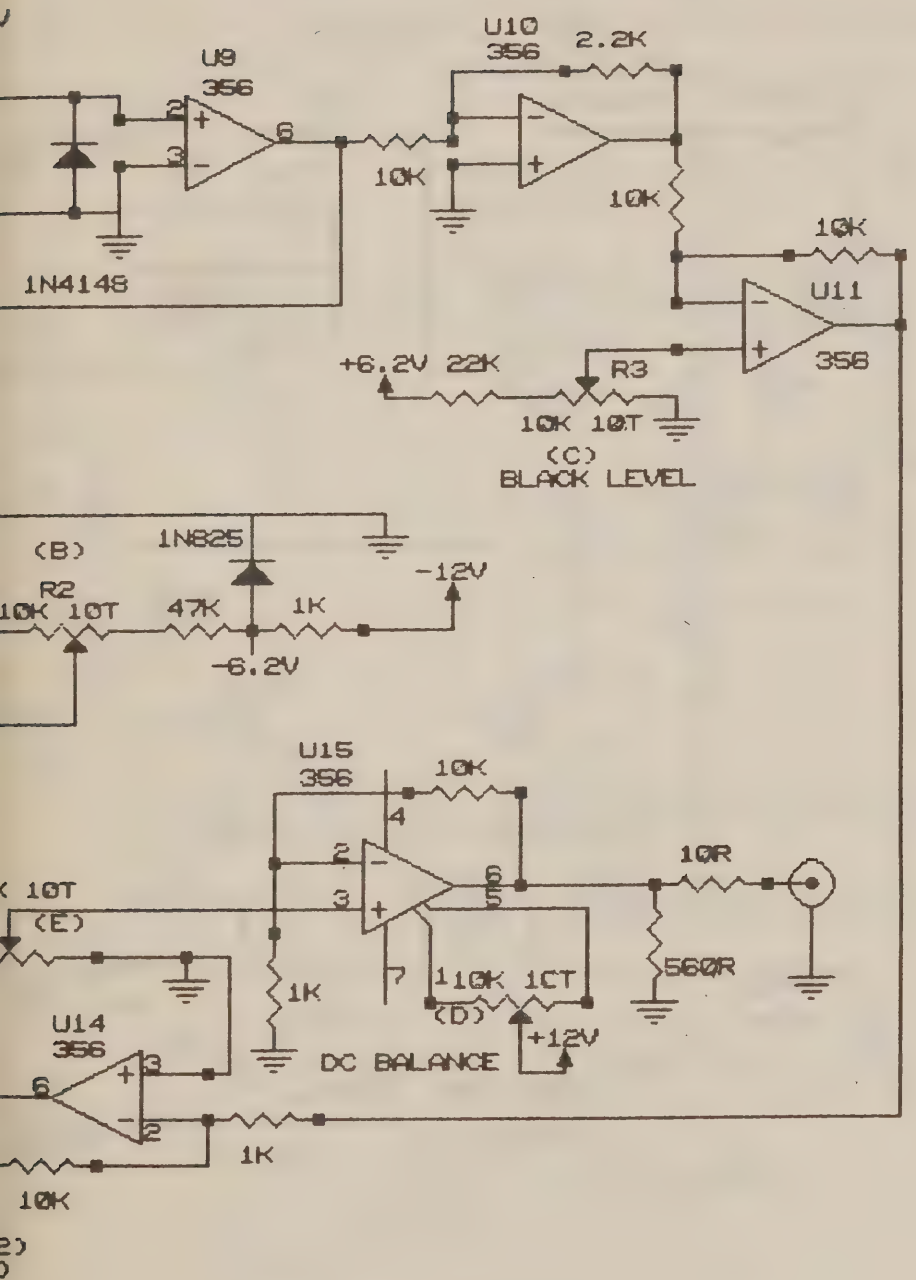

VA
C25
R27
Q10
R28
R26
SCAN
R21
R22
C29
IC2
C21
SUB CARRIER
R25
R24
Q9
Q8
R23
C22
VR
C26
6V8
Z2
C23
REC
SQ
VA
C28
N/C
8
1
N/C
R37
C29
IC5
R38
VB
R35
R34
C30
N/C
5
4
R36
FRAME STORE

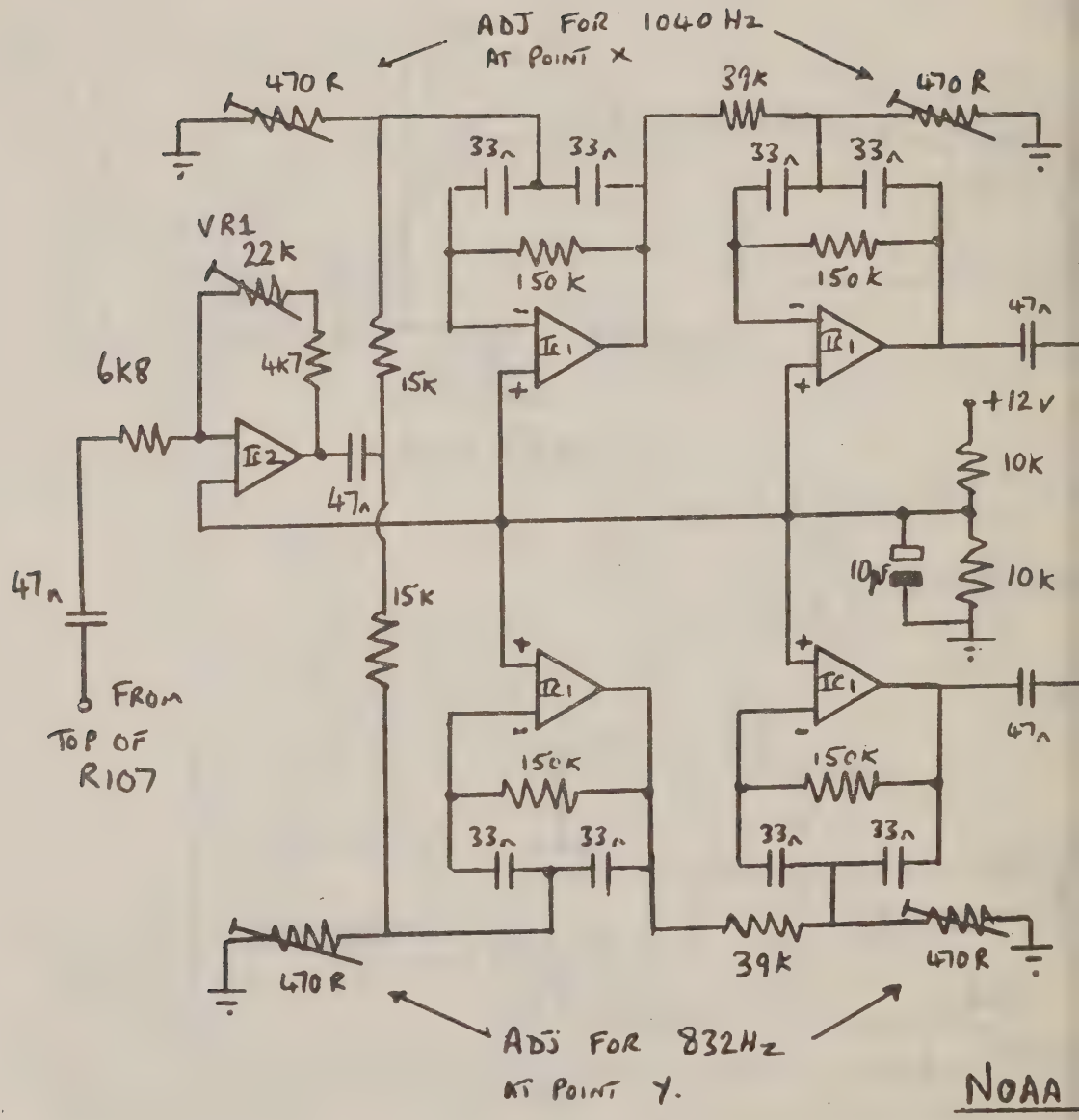


SCANNING RECEIVER

DESIGN BY
G8FAT

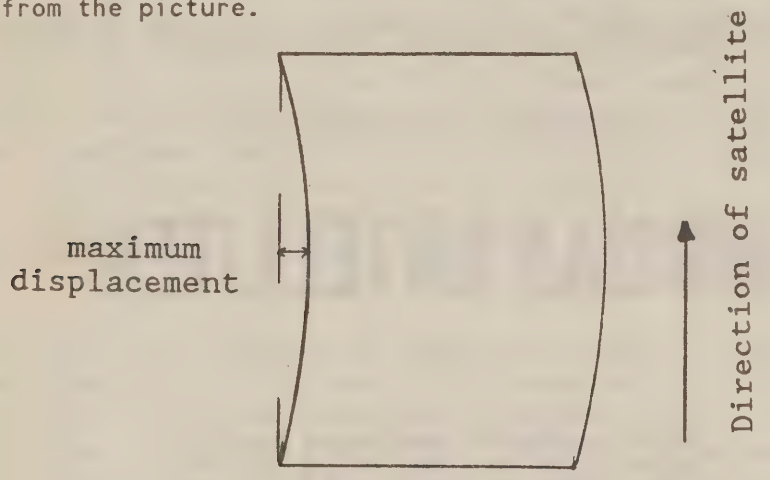
SEE PAGE 39


U9
356
U10
356
2.2K
10K
10K
10K
U11
356
1N4148
+6.2V 22K
R3
10K 10T
(C)
BLACK LEVEL
(B)
1N825
-12V
R2
10K 10T
47K
1K
-6.2V
U15
356
10K
10R
560R
10T
(E)
1K
10K 1CT
(D)
+12V
DC BALANCE
U14
356
1K
10K


ADJ FOR 1040 Hz
AT POINT X
470 R
39K
470 R
33n
33n
33n
33n
VR1
22K
150 K
150 K
47n
6K8
4K7
15K
+12 V
10K
47n
10K
10pF
15K
47n
FROM
TOP OF
R107
150K
150K
33n
33n
33n
33n
470 R
39K
470 R
ADJ FOR 832Hz
AT POINT Y.
NOAA

The simplest use that can be made of this distortion is to note that the maximum displacement occurs when the satellite is closest to the observer ie the lines with the maximum displacement pass through the observers location. This gives a way of matching the picture to the ground beneath in one dimension.

The curved edge of the picture depends on the observers location, the satellite orbit and the speed of light. Assuming any two of these would allow the third to be calculated using measurements taken from the picture.



Form of picture distortion

Figure 1

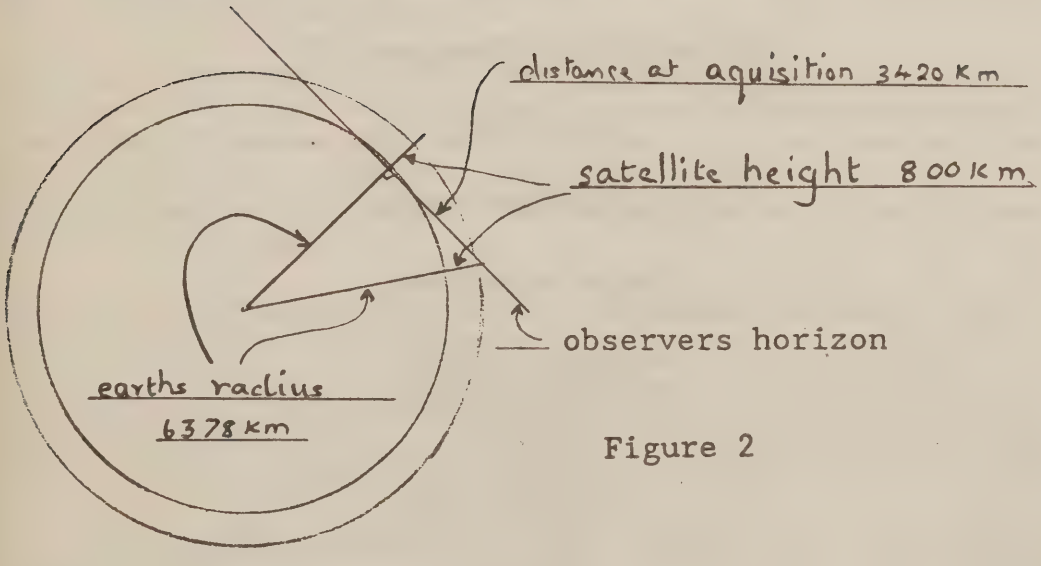


Figure 2

Dick Boardman

THE

HARPENDEN AMATEUR RADIO CLUB

PRESENTS A LECTURE ON

RUSSIAN SATELLITES

BY

GEOFF PERRY

OF THE KETTERING GROUP

The lecture will be held at **Aldwickbury School** on

Wednesday 22nd February 1989

at 7.30 pm.

Admission 50p at the door.

Further details from:

Ian Gurton, GØCPN.
28 Bloomfield Road,
Harpenden,
Herts.
Tel. 05827 3770

SCANNING SATELLITE RECEIVER

by B W Haines, G8FAT

INTRODUCTION

The design has been kept simple as possible to allow the author to receive images as soon as possible and provide a simple design for the novice to undertake. The receiver uses a balanced mixer and extra filtering to over come the problems caused by local PMR stations. A scan and lock with switched 6v rail for tape recording allows un-attended operation and an tone-encoded squelch to stop erratic operation due to your local DIY friend.

CIRCUIT DESCRIPTION

The RF amplifier Q1 (BF981) has 20 db gain with an associated noise figure of about 1 db which sets the systems signal to noise ratio. The signal is then down converted to 10.7MHz by Q2 and Q3 (J310) which forms a balanced mixer. The signal is then passed to Q4 (3SK88) a post mixer amplifier via a 50 kHz roofing filter. The filters in the configuration 150/50/150 kHz bandwidths, these set up a stopband rejection in the order of > 100db. The signal is again down converted by IC (MC3359) to 455kHz. Here an extra amplifier Q5 (3SK88) has been included to improve the limiting characteristics of IC1 from 100uv to 10uv. The recovered sub-carrier now follows two paths a digital and a video path.

The video path consists of IC5 a bifet op-amp bandpass filter with a Q of about 10. The filtered output is passed to S2 which switches the framestore between the live sub-carrier and a recorded one from the tape recorders earpiece skt. The switched signal also passes to the audio amplifier IC6 (LM386) via the mute line with a potted down level for recording.

The digital path consists of a PLL tone decoder IC2 (LM567) who's sensitivity is set by VR1 and when switching off disables the squelch. The output of IC2 is connected to IC1 squelch gate (pin 14). This controls the scan output at IC1 (pin 15). When a satellite signal is being received the PLL output disables Q8 which in turn enables Q9 to provide 6v to power the tape recorder.

This technique of switching the tape recorders power off and on simplifies automatic operation and saves power. Scanning is accomplished by IC3 (NE556) dual timer.

One half is configured as an astable providing a short pulse every second and is disabled by the scan line switching Q10 on and stopping C26 from charging and reaching the threshold voltage. This short pulse is connected to one side of a biased switch biased contact earthed. The pole contact is connected to the trigger of the second half of IC3 which is configured as a one -shot monostable to provide a glitch free pulse to the decade counter IC4 (MC4017). The circuit here is configured for 6 channels where each decoded output has a channel select line to the xtal oscillator and drives Q11 which in turn switches an LED onto indicate the current frequency.

The local oscillator consists of Q6 a 42MHz xtal oscillator with its collector tuned to 126 MHz and a 3 pole filter to Q7 a buffer amplifier who's output goes to the mixer by a two pole lpf.

COMPONENTS LIST

RESISTORS:

R1	68K	R10,12	3K3
R2,27,32	47K	R13,31	5K6
R3	27K	R14	3K9
R4,16,33	220R	R15,26,33	2K2
R5	10R	R17,22	
R6	470R	R28,34	8K2
R7,19	100R	R23,35	10K
R8,20	330R	R25	39R 1W
R9,11,18		R29	6K8
R21,24		R37	390K
R36,38		R39	4K7
R41,42	1K	R40	22K
R30	110K		

VR 50K POT WITH ON OFF SWITCH

CAPACITORS:

C1-8,13,14		C21,37	1uF
C19,28,29,43	1nF	C23	4u7
C6	0.02uF	C24	0.047uF HI-STAB
C9,15,16,18		C26,36	22uf
C22,25,30,31	0.1uF	C35,39	10uF
C12,34	0.01uF	C27	3u3
C17,41	100pf	C40	22pf
C10	68pf	C38,21	100uF
C11	220pf	C20,32,33	2u2

VC 35P TRIMMER
SEMICONDUCTORS:

IC1	MC3359	Q1	BF981	D	1N918
IC2	NE567	Q2,3	J310	Z1	6V1 ZENER
IC3	NE556	Q4,5	3SK88	Z2	6V8 ZENER
IC4	CD4017	Q6,7	2N918/2N2369		
IC5	LF156	Q8,10,11	2N3904/BC108		
IC6	LM386	Q9	BFX85/BFY50		

INDUCTORS:

L1	5 turns 22 SWG 1/4" diam.
T1	5 turns TAPPED at one turn 22swg on a T50/12 ferrite ring
T2	? turns Trifilar wound 26swg on a T50/12 ferrite ring
IFT1	10.7MHz TOKO type KASCK 3892A
IFT2	455kHz TOKO type 7MCS4718N

Ferrite rings and TOKO coils are available from Bonex or Cirkit.

FILTERS

F1	10.7 MHz 150 kHz bandwidth ceramic SFE10.7MJ
F2	10.7 MHz 50 kHz bandwidth ceramic SFA10.7MF

MISCELLANEOUS

X1	10.240 MHz xtal HC25/U
X2	xtal for each desired channel Freq. =(Channel-10.7)/3 HC25/U
S1	biased c/o
S2	2 pole c/o
LED	any type
SP	Loudspeaker

CONSTRUCTION:

The receiver was constructed on a double sided pcb where the component side was left intact and used as a groundplane. No layout has been provided as I used rub-on resist transfers which give a professional look without the cost of producing a pcb using photo techniques. Except for the RF amplifier, layout is not critical.
The RF stage should be screened and input and output inductors kept as far apart as possible to prevent instability.
The receiver should easily fit inside a 8" x 5" box.

SPECIFICATIONS

Noise floor	-138dBm (0.08uV)
20 dB Quieting	-124dBm (0.4uV)
Full quieting	-115dBm (0.7uV)
Tone Squelch range	2.3 - 2.55 kHz
Desensitisation (100kHz offset)	-17 dBm

ON AIR PERFORMANCE

Although I have not incorporated AFC their appears to be no change in picture quality from Algeria to Northern Finland due to doppler shift. The receiver was tried at work (lots of funny noises there) using a wire dipole, and even when the satellite signal was weak no interference was experienced from a PMR repeater on 138.1 MHz which was about 1 Km away and was measured at -50dBm on a HP 141T spectrum analyser using 6" of solder as an antenna.

COMPUTERS APPLIED TO REMOTE SENSING

by Peter Newman

In this article,and any subsequent sequals, I intend to present some of the problems and attributes of applying computers to satellite remote sensing. The gift of the computer revolution has enabled the amateur to enter the field of automatic data processing of weather satellite signals.

What are the advantages of using a computer to process images ? The answer must relate to each individual computer type. Some computers are sophisticated enough to display images far beyond the capabilities of the frame store, others will not even produce a recogniseable picture. However good quality images and a healthy bank balance do not always equate.

There are packages capable of producing images on various types of computer, most of whichtend to share the basic first principles of data aquisition and processing techniques. One such application is the GEMS system used by NRSC at Farnborough. The processing of very high quality images by very professional staff has produced, as far as I know, the finest examples of remote sensing.

COMPUTERISING THE IMAGE

The basic principles of digitising a satellite image must be divided into sub-sections:

1. Generation of a clock reference signal by recovering the clock from the 2.4Khz sub-carrier.

2. Decoding the line, frame ,and start-stop synchronisation elements required by the computer display routines.

3. Demodulation of image data by the analogue to digital conversion of the signal sub-carrier.

It is possible to achieve most of the above processes by Digital Signal Processing, however, as this subject is rather complicated I will postpone it's techniques to a later article. An alternative is to use existing hardware ie the Frame Store board (001) and pass the digital signals to the computer. Note, however, that the frame store does not run at the image maximum resolution. In fact with meteosat only two thirds of the possible resolution can comfortably be achieved without seriously modifying the original design.

It is important to define the qualities which make a particular computer suitable for Remote Imaging. The satellite images are made up of discrete pixel elements combining to form a picture. Most computers have a different approach to the presentation of the pixel, the main differences are the size, shape and the range of colours. Smaller pixels and a large range of colours present a better defined image. The larger density screens require more memory to store the image. Consider a standard Meteosat frame: 800 pixels by 800 lines (not including synch) and 256 levels of intensity per pixel. To present this image it needs 1 * 800 * 800 bytes of storage (one byte being 256 levels of grey) which is 640 000 memory cells. A NOAA image has a greater burden on memory than a Meteosat frame approximately 822 000 memory cells (on an average pass). This alone is the raw data. To process the image and present a picture requires a fast processing device. Modern computers using the 68000 ,80286/386 and RISC devices have no problem as the time to process individual machine instructions tend to be very quick. What is more important is that the computer memory needs to be filled with the raw image data. The data from Meteosat is clocked at approximately 3200 pixels per second and has to be stored and perhaps processed in real time. The common method of reading the data into the computer is to convert the pixels from an analogue voltage to a parallel 8 bit word and then present the data to the computer input port. When the data is stable an interrupt is generated to instruct the processor to read the data into the correct memory location, repeating the process until the complete frame in loaded. Therefore the computer must be able to handle the interrupts at the data clock frequency. This tends to be the biggest burden on some machines in that the computer cannot handle the frequency of the interrupts and then does not have sufficient memory to cater for the complete image. Therefore acceptable limitations must reduce the capabilities of that system. One such compromise is take the image at a reduced rate, perhaps using both pixel and line skipping techniques. This method is used by the frame store to select different parts of the image using selectable clock rates. Once the image is loaded then the advantages of the computer come to life.

The image processing capability is perhaps the most important attribute of using a computer system for Remote Sensing. The raw image in memory can be doctored to bring out certain features of the frame, eg. define areas of fog, or cloud types and present them in a colour to make them stand out. One process that is very widely used is contrast stretching, on a winter daytime CO2 frame the land appears very dark due to the low position of the sun. Contrast stretching allows the land features to be enhanced to present a very clear picture. Processing an IR image makes it possible to produce the same features as the Visible Light sensors, or even combine the two pictures to get a compensated image.

The timer facilities of the computer make it possible to synchronise the collection of images based on the overhead passes of the orbiting satellites and to collect the Meteosat frames on an automatic selection from the dissemination schedule.

I will now try and identify some advantages and disadvantages of the more popular computer systems. If anyone would like to comment on these findings please contact me and I will hope to correct or append the information.

The most popular computer system seems to be the PC format machines. It is difficult to identify the ability of the PC as it takes many forms and is continuously changing in performance and shape. The basic 8088 machines tend to be rather slow. However, the increase in clock speed to 8Mhz has introduced the 16 bit 8086 and the V20 machines. These are more suited to data processing. Although the addressing capability of the unexpanded machine is limited, the expansions to 1 or 2 Mbytes tend to be rather expensive. The introduction of the 80186/286 and 386 (and soon the 486) has moved the PC forward whilst keeping the machines compatible. With the application of these devices (especially the 386) to the VGA (Virtual Graphics Adapter) cards, now becoming the standard in newer PC systems, the results should be remarkable. The VGA gives a basic resolution of 480 lines, 640 pixels by 256 colours. This sort of display is very well suited to displaying weather pictures. In my opinion the 8086 would be wasted connected to a VGA card. The CPU still needs to process the data displayed by the graphics adapter. The EGA system is limited by colour selection, although false colour images can be interesting. There must be many types of card for the PC of which I have not heard. I hope I have covered the versions which users would consider for wefax reception. The Nimbus computer , the base of Dartcom's system, uses the 80186 cpu. The advantages with this machine is the size of the memory,1Mbyte, and the inclusion of the colour card (I'm not sure if this is standard). This allows the full NOAA and METEOSAT images to be loaded and processed. The results are very good. The 720 K floppy disc drives prove to be handy for archiving images from a hard disc drive.

Perhaps the next popular computer applied to weather reception is the famous BBC micro computer. This machine although only an 8 bit CPU has displayed much promise in the field of satellite imaging. The main limitation of the computer in this field is the display attributes, by which I mean the limits placed on both resolution and colours. The computer has a very large education field and still proves to be well used by the RIG members. The reason it has proved so popular is the price to performance ratio.

There are various systems which use the computer as the data collection and display station for a small system. The hardware interface to the computer has been simplified by an excellent I/O structure enabling many devices to be connected simultaneously for control applications.

Moving along to the Atari ST range of computers, the machines are based on the 68000 micro-processor which proves to be a popular and powerful device. The ST is perhaps the common step into the 16 bit computer world. The advantages of this machine are perhaps highlighted by the fast processor applied to a much welcomed 1 megabyte (or 512K) of memory. The large base of memory lends itself to processing satellite images while the graphics give a good presentation although a greater range of grey levels (8 in 512 colours) would be an advantage. The storage of a complete NOAA image once contrast stretched, enhanced and optimised can produce a very interesting picture

For this article, last but by no means least is the Acorn Archimedes. When I heard about this machine it seemed that the design was based around the satellite image processing world, I immediately started a detailed investigation into the true nature of the computer. The main interest lay in the ability to display a 512 by 640 pixel screen, each pixel stated as being one of 256 colours. This is only true however, in certain modes (16 colour modes). The selection of a specific colour is out of a choice of 4096 (4 bits - 16 levels, per gun). In the 256 colour modes this choice is less controlable. The VIDC (video contoller chip) does not have the ability to create any more than 64 colours, so a tint (fine intensity control) has been implemented, 4 levels of intensity giving 64 * 4 = 256 colours. This is by no means a serious limitation because excellent images can be produced on this machine. The real advantages come to life when the processing capabilities are considered. When programmed in any language (even BASIC) the machine performance is outstanding. A contrast stretch of a full 800K NOAA image on the Atari took 1.254 seconds to complete, the Archimedes finished the same task in 25 milliseconds! The memory size on the 310 machines is quite adequate for image processing, although the 440 with four times as much is rather more flexible. Be aware of the fact that the 512 * 640 * 256 col screen takes 320K of memory. The drawback must be the price, because they are quite expensive.

There are some computer systems not included in this article which are just as capable or even more suited than those mentioned. The facts for each machine are based on my own knowledge perhaps limited in many areas.

If you feel that any of the information is incorrect or you might have futher details I would be most interested to hear from you. I have tried to be as fair as possible to bring the good and bad points for each machine. Every user has different requirements of a computer system, I feel that it would be impossible to cater for every possible combination, I have limited the study to remote sensing any carefully steered away from any other applications either in software or hardware.

WEATHER FAX GREYSCALE GENERATOR

George Isleib W3CPR

Reproduced from The Journal of the Environmental Satellite Amateur Users' Group by reciprocal arrangement, thanks to Greg Mengell

INTRODUCTION

During the past five years I have had the pleasure of observing the APT (automatic picture transmission) imagery from both the U.S. and Soviet polar orbiting spacecraft.

This is a fascinating and rewarding field of which little is known. This article is intended for the amateur who for the most part is now in a position to receive either the geostationary or polar orbiting spacecraft with capabilities of reproducing the APT imagery either by electro mechanical or digitally processed system.

THE PROBLEM

This circuit was the result of necessity being the mother of invention since to my knowledge there are very few systems of this type that actually generates the grey scale necessary to determine whether or not a system is really up to snuff.(Perhaps any American reader can enlighten the Editor re the meaning of 'snuff', or is it a typing error) I have used both electromechanical and digital systems. Only the digital storage units have the capability of internally generating the grey scale but it is a post injection type, meaning the grey scale by-passes the input circuitry and is no way an indication that the input level is correct to produce all shades. This leaves us in a position of either guessing where the levels are to be set or trying to set up the input level on the eight shades of grey transmitted by NOAA or METEOR series polar orbiting satellites.

SOLUTION

Since it is difficult to obtain a commercial unit, I decided the time has come to come out of the dark and design a unit to bridge that gap. I felt from the conception of this idea that certain criteria must be met in order to make it as simple as possible. First it had to use readily obtainable parts, require no screening or special construction, easy to calibrate and operate, crystal controlled for long stability and include all speeds and grey

levels. This may sound like a complex project, but it is very simple and straight forward in its design.

PARAMETERS

For satellite work there are two horizontal frequencies involved, namely 120 and 240 lines per minute. For practical purposes, 8, 16, and 32 shades of grey will more than suffice as anything beyond 32 shades is stretching the limits of the human eye. Even though 8 shades is not quite enough, it is a good place to start when it comes time to calibrate. The satellite uses a 2400 Hz clock which is synchronised to a cesium standard which is quite critical. The subcarrier on the grey scale generator must be within .01 Hz or we end up with a skewed picture. The Soviet satellites use approximately 2500 Hz but this is nothing to get excited about when using a phased locked receiver.

HOW IT WORKS

The clock part of this circuit (U1,2,3,4,5) is on page 53 and the main circuit can be found in the centre fold pull outs.

It is used as a straight forward CMOS crystal oscillator running at 2.4576 MHz and in turn is fed to a 12 stage binary counter U2 to give us a divide by 4 (2400.00 Hz) pin 14 U2, which is our precise subcarrier frequency. The 614 KHz is fed to a divide by 3, U3 to generate 204.800 KHz which feeds U4, a divide by 100 to produce 2048.00Hz. Since the 2716 EPROM is addressed in 512 byte elements, and since 240 lines per minute are necessary at the higher line rate, a quick analysis shows that 2048 divided by 512 bytes equals 4 or 4 sweeps/2048 cycles. One can also determine that a sweep of 120 lines per minute corresponds to a sweep of 2 Hz per second or a clock of 1024 Hz addressing the EPROM since 1024/512 equals 2.

This is a little confusing but to make this all happen is very simple. By following th schematic all we have to do is switch either the 2048 Hz from U4 to the 12 stage binary counter U6 or divide 2048 by 2 at U5, feed that to U6 and we will be able to generate 120 or 240 lines per minute to address the 2716 in 512 byte increments. The data output from the EPROM U7 addresses the AD7523, a digital to analog converter that produces a voltage output proportional to the binary address from U7. In this case a zero output from U7 corresponds to an address of 00 and 5 volts represents an address of FF. The diode (1N4148) across pins 2 and 3 of U9 is extremely important as it serves to protect the input of U9 from exceeding a negative value during power up or down.

The output of U9 is now a staircase that goes from +5 volts to 0. IC's U10, U11 and U14 serve as inverters and level shifters so that the level at pin 6 of U14 swings from -5 to +5 volts.

The square wave output of U2 pin 14 is fed to a tuned bandpass filter U12 which converts the square wave into a very good sinewave that is necessary for U13. Since U13 is a transcondance amplifier, the output because of the combination of two inputs, (pin 5 and pin 13), produces a 2400 Hz sine wave modulated by an 8,16, or 32 step scale.

This output is fed to U15 through the 1K pot in order to vary the output from 0 to 8 volts P-P with an output impedance of approximately 600 ohms unbalanced.

CONSTRUCTION AND CALIBRATION

The construction of this unit is not critical and only ordinary wiring procedures need be followed. The one item of specific interest during the wiring and construction is to make sure the Vcc voltage on U5,U6,U7 and U8 as this is 5 volts and if 12 volts appears on chips U6 or U7 it will probably destroy the E-PROM.

I would recommend using sockets for the devices so that when it comes to time to check the Vcc lines if one is wrong it won't lead to catastrophic results. This unit was bread boarded as no intent was made to place it in a cabinet. This we will leave up to you since, as I said, nothing is critical.

I used a Heathkit IP-2718 power supply that was the source of the plus and minus 12 volts and 5 volts that are required. Lets start by setting all 10 turn pots to their mid point positions. All voltage and wave forms are read with reference to ground. I would highly recommend using sockets for all IC's for two reasons. First with all IC's out of their sockets you can read all Vcc and Vss voltages making sure all are correct and second, when it comes time to replace an IC if one fails, it is a God send.

With a standard voltmeter, check all the Vcc (+12 and +5) pins to make certain they are correct with respect to the diagram and then check the Vss (-12) for the same condition.

When you are sure all is well, remove all power and insert all the IC's in their proper sockets. Turn on the power supply and check for any overheating, smoke etc. On the initial unit the +12 volt supply drew 35mA, the 12 volt supply drew 27mA and the 5 volt supply drew 60mA. Of course this will vary from unit to unit but should certainly be within 10% of this value.

At this point two pieces of test gear are required. First a frequency counter and second is a DC coupled oscilloscope, not necessarily a fast one, but DC coupled for sure. With power on, place the counter on pin 3 of U1 and read 2.457600 MHz (if you are lucky) otherwise adjust the small trimmer (7-35 pf) to precisely this frequency. If adjusting the trimmer does not bring the frequency exact, there are several approaches. First replace U1 with another IC if available. Second, if the frequency is high add capacity to the 22pf capacitor in parallel to the trimmer of if the frequency is low, remove the 22pf capacitor entirely. One way or another will work, in any case try and get the frequency within at least 10 cycles.

Measure the frequency at pin 7 of U2. It should be 614.000 KHz and pin 14 of the same IC should be 2400.00 Hz.

Place the counter on pin 10 of U6 and toggle S1 between 120 and 240 LPM and read 1024 and 2048 respectively. The LED at this point should be flashing in time with the 120/240 LPM switch. In the 120 LPM position the LED should be flashing 2 times per second and in the 240 LPM position it will flash 4 times per second. If it is not blinking, it is either wired backwards or a problem exists at U6 or U7.

Set the oscilloscope to 2v/cm and place the probe on pin 6 of U12. Adjust R1 for the best symmetrical sine wave you can get. It will have a peak at the 2400 Hz point and when this point is reached, no further adjustment is necessary. This amplitude is about 8 volts P/P so be careful this voltage is not too high for your's counter's input stage.

At this point we will be dealing with waveforms that are not standard sweep frequencies so you may have some problems trying to sync properly. This is the reason for the "sync" point at pin 12 and 23 of U6 and U7. Place your scope in the external trigger position and connect the trigger input to the "sync" point as mentioned before. Set the sweep speed to 50Ms/cm, input sensitivity to 5 V/division and the sync level to +. Set the shade select switch (8,16.32 etc) to the 8 position and place the scope on pin 6 of U9.

You should read an 8 level staircase going from 0 to -5 volts. Set the sensitivity to 1 V/division and place the scope on U10 pin 6 and read another staircase except this time the steps will be going from 0 to 1 volt P/P. Set the scope to .5V/division and place the probe on pin 6 of U11 and adjust R3 for a symmetrical staircase going from + .5 to - .5 volts centered about the base line or 0 volts.

Set the scope to 5V/division and place the probe on pin 6 of U14 and once again adjust R3 in the same manner except this time the amplitude will be from -5 to +5 volts. Set the scope to .2 V/division and view a waveform on pin 6 of U13 that sweeps symmetrically in 8 even steps. If you increase the sweep speed to staircase. Set the scope back to 20 ms/cm and the vertical sensitivity to 1 V/division. Place the scope probe on pin 6 of U15 and adjust R4 for a perfectly centred waveform of 8 steps centred around the 0 volt point.
Readjust R2 so as to have the peak of the waveform the same amplitude both positive and negative about the 0 axis.

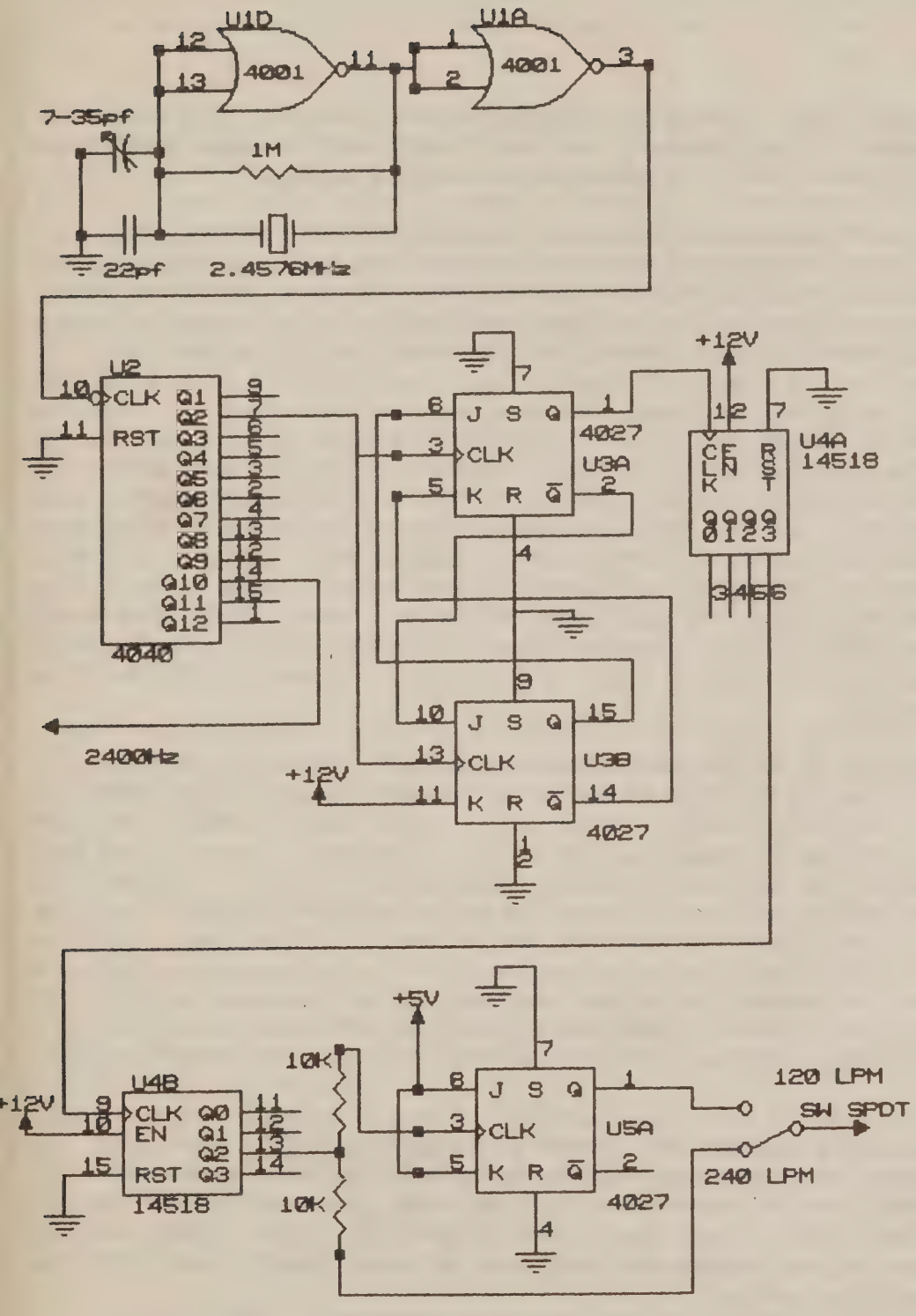
With the shade select switch in 32 step position adjust R3 so that the first step is at 0 volts. Be positively certain you can view the beginning of the staircase because what you are looking for is a symmetrical staircase that goes from 0 to 32 steps with the first step starting at almost 0 volts which represents black and the final 32nd step representing white.
Switch back and forth between all the shades, making sure all are present. R3 determines the black level, so don't pinch it off too far or you will loose some steps at the beginning of the sweep.

Conclusion

The output stage has a fairly low impedance and a fairly high output which can be adjusted to drive most any systems. I did not make any attempt to make it match all sorts of impedances but only to make it low so it will drive just about anything you want.

It would be a good idea to use a shielded audio cable from the generator to your device for obvious reasons. I will be happy to supply a pre-programmed E-PROM and a printed circuit board with over lay for parts placement and some other small points of interest for 22 dollars including shipping cost for those who would like to make small neat layouts. I did not include the power supply on the circuit board as this would have necessitated a particular transformer which some may find it difficult to obtain.

For those who lack the test equipment for the necessary alignment I suppose some arrangement could be made to supply the generator completely assembled and aligned.



CLOCK CIRCUIT FOR George Isleib's Grayscale Generator

MEMBERS LETTERS

Dear Phil,

Having just successfully completed Henry Neales Loop Yagi for Meteosat, I am writing to let you , and possibly others know of my experiences with this antenna and receiving Meteosat.

I found the antenna presented few problems as I followed Henry's instructions and it worked first time. I obtained the aluminium for the boom from our local scrap man, who is very willing to allow people to look around his yard and buy his scrap. I could not find a square section and had to use 'U' section, which is quite rigid. The wire for the elements was also dug out of his skip. I did not use the insulators suggested, to keep the elements from the boom and prevent corrosion, as I felt there cost was ridiculous, and so bolted everything to the mast. Having access to machine tools I managed to get an 0 BA screw bored and the head turned down to take the coax feed. For the reflector I used fly screen which I got from a builders merchant. It is used for keeping flies out of places they shouldn't get into!! and is of very fine mesh. I constructed a wire frame to bolt to the boom and over which I attached the mesh using fine wire. For the length of RG141, I used the Farnell Electronics equivalent, which is sold in 0.5 metre lengths (at 3.50 + a length).

Mounting of the finished antenna presented a number of problems as I was mounting the Dartcom converter behind the mast to minimise the 1.6 GHz feeder length, but again the scrap man provided a pole and odd lengths of aluminium, and the local exhaust fitter provided pipe clamps. The only other problem encountered was that I forgot that the antenna had to be pointed up at an angle of 30 degrees and the reflector fouled on the mast and is now a little bent! The beam width seems quite wide as the antenna can be swung over quite a wide arc before the signal degrades. I also discovered that the Dartcom receiver takes about 15 minutes before the thermally stabilised xtal oscillators stabilise and I get a 'perfect' picture.

For anyone who has not ventured to using Meteosat then I would thoroughly recommend it. The pictures are always available, the infra red pictures are very much better than NOAA and you can get excellent pictures 24 hours per day; you get coastal outlines and views over a very wide area as well as water vapour content pictures, and weather maps and goodies not to mention not requiring prediction tables.

To anyone who has been frightened off the Loop Yagi, I would say give it a try, and with luck you should finish up with a very cheap alternative, which is much easier to mount, compared with the usual dish.

I still haven't finished converting the Fax recorder I obtained from Brian Weeks, but with the excellent Meteosat pictures that project should receive a fresh impetus. However, when I was at the RSGB thrash at the NEC in July, I spoke to someone's whose name I have lost (Peter Newman, correspondence via the editor please, mark for his attention) , on the RIG stand who was showing a superb graphics system based upon a Atari ST Computer. It appeared to do everything, including capturing and then manipulating Meteosat pictures, to provide a sequence of pictures which showed the weather change over period.

Whilst the Atari ST graphics resolution is not as good as that of the Amiga Or the standard YU3 framestore), and there is now available an Amiga Fax system which is also superb, (if you want to round off the superlatives then have a look at the Archimedes computer running the weather satellite software that is available) I wonder if the person who developed the system will release copies of his software and I wonder if he can modify it to emulate the very large numbers of colours that some software can offer to improve the apparent resolution.

I must thank everyone whose modifications to the framestore and all the other articles in the RIG magazine have given me so much enjoyment, and only hope that one day I can give back to RIG as much as I have taken out.

Regards,

Peter Seddon.

Dear Sir,

As a very recent initiate into RIG I put pen to paper to say how very much my own situation follows that of Mr. A. Jaques who wrote in the June edition.

My hobby is climatology. I have been running a co-operating Met Office station at Halesowen since 1946 in a variety of forms. Any knowledge of radio or electronics is extremely limited, almost minimal. As I could not hope to build a system, I purchased a Martelect one, the final part which arrived last week.

I have been shattered to discover that I can hardly receive any images at all. Meteosat is destoryed by 5 second burst of

activity at regular 1 minute intervals leaving white bars across the screen. NOAA reception is similar affected, though to such an extent that no signal is audible. There is a continual succession of burring noises on the receiver. Both I am told, is paging.

My suitation is 4 miles due south of Rowley Hills where an array of antennae is based, and Romsley Hill, carrying a further array, bears 25 degrees east of south. This is I presume, where my problems originate. Romsley is 2 miles distant.

What little I have managed to see of Meteosat has wetted my appetite, but I can see little, if any hope, of obtaining worthwhile images due to the problems out lined. My hope was to supplement the Fax maps received daily from Bracknell on short wave. Unfortunately I do not have the necessary knowledge to do anything about this personally so must reluctantly admit to defeat, and a very expesive one at that!!

I have contacted the D.T.I. radio section in London outlining the problems, but do wonder as a mere novice, how the regulating authorities allowed the earth borne system to sit so close to the frequency used by satellites on their limited power.

Your's sincerely
C.D. Roberts.

NOAA 11 - Launch Report

NOAA 11 was launched from the Vandenberg Air Force Base in California on September 24th 1988 by an Atlas-E rocket (originally built in 1961 and refurbished for this mission).

New and improved instrumentation has been incorporated in N11, the newest is the Solar Backscatter Ultraviolet Spectral Radiometer, Mod 2 (SBUV/2). This has been designed to map the Earth's ozone layer by measuring the amount of UV reflected back from the atmosphere, and as such can provide a map of the ozone distribution for the Earth each day. This complex system appears to work satisfactorily for daylight orbits, but not well on morning orbits, as a consequence, it will probably only be installed for full daylight satellites.

International Telephone & Telegraph (ITT) supplied the high resolution infrared radiation sounder and the radiation instrumentation to measure cloud cover and surface temperature.

Britain supplied the stratospheric sounding unit, NASA the microwave sounding unit for temperature and humidity monitoring, and France the ARGOS Data Collection System.

The Data Collection System (DCS) receives readings from over 2000 buoys, balloons and remote weather stations around the world and on command re-transmits the information to the ARGOS station in France. It is also believed to be monitoring seals in the North sea for the Sea Mammal Institute in East Anglia.

Apart from the weather operations N11 carries the search and rescue system, SARSAT, this relays distress signals from emergency position indicating radio beacons (EPIRB). With two NOAA satellites and two Russian satellites carrying the system, distress signals can be detected within an average of 2 hours anywhere. The signals are re-radiated and received at a suitably equipped ground station, which in turn passes the information to search and rescue centres. In the Northern hemisphere coverage is virtually 100%, but with few ground stations in Chile and Brazil, coverage in the Southern hemisphere is restricted.

The accuracy of the system is about to be improved, the normal VHF frequency of 121.5 MHz can locate to within 20km, but with a new frequency of 406MHz being adopted, together with an encoded signal, the new system can process the data on board the satellite and re-transmit only when in range of a ground station, resulting in a position to 2-5km.

Since the first satellite with SARSAT was launched in 1982, 506 sailors in maritime distress, 596 people in aviation emergencies and 47 people lost on land have been rescued with this system.

The design life of the NOAA satellites is two years, so NOAA 9 launched in 1984 is two years past its 'Best By' date!, it currently (Nov. 88) has problems with microwave sounding instrumentation, so by the time you read this it will probably have been switched to stand-by mode and N11 will become the primary lunchtime satellite.

NOAA currently has three more satellites in the works, and it is believed China is to launch more NOAA type satellites in the future.

With the cost of a satellite around $50,000,000 (not including the launch vehicle), and a design life of 2 years, it works out at around 10,000 dollars (#5700) per orbit, or #56 for every minute you receive the signal.

Source:- Aviation and Space Technology.

8 October 1988

Dear Phil,

The Satellite scene has broken new ground recently with the launch of the new Russian infra red weather satellite and the new Chinese satellite both of which I picked up within a short time of the respective launches. Additionally the launch of NOAA 11 went as planned and that is now operational.

I haven't seen Met 2/15 since my last logging on the 1st August; that cleared the way for Met 3/2 which uses the same frequency 137.85 MHz. My first contact with Met 2/3 was while monitoring overnight on that frequency, I regularly leave my recording system set to 137.40 and 137.85 MHz particularly Tuesday, Wednesday and Thursday when the Russians have a preference for tests.

Met 3/2 was picked up during such an overnight session 14th/15th September on 137.85 MHz when I found my tape was full of infra red data containing the Russian telemetry format so I new that 3/2 was operational.

It transmits visible pictures in daylight including a grey scale and phasing bars, some 15 or so in number. In eclipse it has been transmitting an infra red image with fewer phasing bars and no grey scale. Recently it has been off then on then off in eclipse.

Its the first time, as far as I know, That the Russians have successfully operated a satellite of this type. On many previous launches the satellites start transmitting infra-red but only for one or two orbits. Then they revert to visible frequencies.

Met 3/2 transmits a wide format picture and so I have been able to see Cyprus, Syria, Iraq and the whole of Turkey from this polar Orbiters for the first time. Previously these regions were only to be seen by Meteosat.

Met 2/16 was not on during late September (22nd) but came back on in early October and remains on 137.40 MHz.

Several months ago the Chinese announced that they planned to launch an APT satellite and since that time I (and no doubt many others) have been waiting for the test to start. On September 29th I picked up a NOAA type picture on 137.04 MHz which I first thought to be a simultaneous broadcast from NOAA 11 but the picture was inconsistent. Later on I got the Kepler orbital elements for Feng Yun 1 the new Chinese satellite and was able to confirm that it originated from that satellite

Feng Yun 1 sounds just like the NOAAs transmitting 2 visible adjacent pictures and presumably the electronics were both bought from the Americans. I expect that a second picture-perhaps infra-red-will be added soon.

My first contact with NOAA 11 came on the 25th September at 1428 UT and was a westerly pass. It had not been on for the previous passes since I had been scanning all day. It is on 137.62 MHz and has a similar orbit to NOAA9 but passes over the U.K. during the middle of the day-more convenient than NOAA 9. It is due to have infra-red added to the telemetry shortly.

Using hone written computer programs I know when Cosmos 1766 and Okean are suitably placed and for those days I leave the receiver set to 137.40 MHz and on 9 and 10 September I recorded good Okean passes.

Goes-E continues to broadcast a scheduled sequence of pictures that it both produces itself and also those that it collects from NOAA 9 and Goes-W. During September I collected a sequence of pictures of the Hurricanes.

Summary of APT satellite currently in regular operation:

NOAA 9	137.62 MHz	MET 2/16	137.40 MHz
NOAA 10	137.50 MHz	MET 2/17	137.30 MHz
NOAA 11	137.62 MHz	MET3/2	137.85 MHz

FENG YUN I 137.04 MHz

Occasional broadcasters:

COSMOS 1766 137.40 MHz
OKEAN 137.40 MHz

18 November 1988

Dear Phil,

METS 2/16 AND 2/17 IN SUNLIGHT AND ECLIPSE

From time to time I have waited in vain for one or other of these Russian APT satellites to "switch on" as it came out of eclipse southbound from over the north pole. At other times everything seems to be absolutely normal.

So recently I started to analyse my log book in which I keep a careful record of every satellite pass and realised that certain conclusions can be drawn about the Russian Mets.

During most of September 2/16 was operating normally, as seen from the U.K., passing southbound in the afternoon. On 22nd of September at 1625z it was not on although passing 75 degrees to the west. I continued to wait for it on later days but not until October 2nd did I see it again. After that it remained operating normally.

Similarly 2/17 was loud and clear during September and I monitored it until 1010z on October 10th after which it wasn't on. I expected to see it switched on by late October but it hadn't come on by the 5th of November. By then my curiosity led me to work out the percentage of illumination of its sub-satellite point and I realised that during these periods it was "only" seeing some 60-70% presumably not enough to trigger its transmissions. I noticed that during the next few days (7th of November on) it would be encountering over 70% ground illumination and so I made sure I was around for every pass that followed.

My patience was rewarded on the 9th of November when its southbound pass at about 2pm. started the transmission and I was able to note the aperture fully open and ground illumination was almost 100%. Presumably during winter conditions when it is travelling near to the terminator it requires a higher percentage of ground illumination before switch on. I have seen the Mets switch on at lower levels in summer when the terminator is at a steeper angle.

Perhaps this observation has already been made by many of the more experienced R.I.G. members but my scientific curiosity was very satisfied with the experiment! I would be most interested to know more about the operation of the Mets how nice it would be for such information to be made freely available by those who know.

Lawrence Harris

Lawrence continues in a subsequent letter (23 November) with more reports:

Met 3/2

This satellite holds the promise of occasional infra-red pictures but has been switched on and off several times during Autumn. It was back on in late September on a regular frequency of 137.85 MHz during the day with visible format pictures. Its first known frequency was 137.30 MHz though I never saw it on that one. On October the 22nd it was transmitting infra-red pictures with an unusual temperature profile. By the 7th of October 3/2 was off in eclipse. It was orbiting from north to south during morning passes and so I waited and as expected it switched on as it entered sunlight when leaving the north pole to pass over Scandinavia. Its aperture was fully open, as indicated by its telemetry, and gradually reduced as the pass continued.
The detail revealed in the Sahara desert was incredible and I shall photograph it as soon as possible.

Mid October saw Met 3/2 produce close ups of Cairo and the Nile which were breath taking. Other usually clear views were obtained of Newfoundland during a 3 degree elevation pass on the 15th of October. The infra red facility was off until 25th of October when at 2152 gmt I received a live picture in which the sea was dark and clouds were light. This is similar to the NOAA format in principle but until I can see more pictures I am not sure whether it has better resolution- I suspect that it has!

At 0718z on October the 26th I got my first chance to see the change over from infra-red to visible when Met 3/2 came over the north pole transmitting IR then entered sunlight. I got up early (!) and was rewarded by 8 minutes of IR showing excessive cloud cover and then at 0726 gmt there was an immediate change over to visible picture format. The change occurred at about 75% illumination and the dynamic range of signal (black - white levels) was significantly increased (ie one needs to turn down the white level).
The telemetry format changed from just a few phasing bars plus picture to the usual 15 bars, grey scale and picture. The next day Met 3/2 was again off and I have not seen it since. I would add that I scan all frequencies when it is due, just in case its frequency has been changed.

contd/.....

Feng Yun 1

During October this was giving pictures on 137.04/5 MHz. It was transmitting continuously on every orbit ie both northbound and southbound passes. In eclipse the pictures were blank; I recorded several overnight passes just in case of IR being added. On October 14th FY was not transmitting for the mid-day pass and this was confirmed on subsequent daytime passes but it was on on the 7am pass. By late October it was off on all U.K.passes and despite searching the entire 136-138 MHz band it was not heard anywhere. I haven't heard it since 23 October when I recorded an overnight pass which included an extra picture which was presumably IR but it contained no data.

Met 2/16 and 2/17

As you know these satellites don't normally transmit in eclipse and so when there passes are in eclipse over the U.K. we don't here them. The orbits of most of the Russian APT's cause them to move successively earlier and 2/16 has been passing over the U.K. during daylight hours in October and November and has been on.

I saw Met 2/17 at 0742z on October the 8th when it was running along the terminator for the whole pass and moving towards the pole. I did not see 2/17 for some weeks after that so I checked its illumination using a computer program and realised that it was only 60% or so. Further checking showed that it was about to move far enough into sunlight to come on and it duly did on November the 9th proving that it must require at least 80% illumination before coming on.

NOAAs 9,10 and 11

These continue as normal, IR having having been added to NOAA 11 two or so weeks after launch as expected. I spotted a problem with NOAA 9 in early November in which the synchronisation of picture transmission slips. It has become slightly better recently but still continues.

GOES-E

Some excellent views were seen of the Tropical Hurricanes and some very picturesque views are to be seen via the GOES-W frames that are broadcast from GOES-E.

Lawrence Harris.

THE RIG 136 - 138 MHz SYNTHESISED SATELLITE RECEIVER

INTRODUCTION

This receiver which is only available through RIG has been specifically designed to receive F.M. APT. (automatic picture transmissions) from NOAA. and other orbiting weather satellites in the 136 to 138 MHz band. It will also function as an IF. receiver when used in conjunction with a down converter for reception of Geostationary weather satellites in the 1.69 GHz band.

The receiver is a double superhet design with a 1st 1.F. of 10.7 MHz using 2 cascaded ceramic filters to provide an IF. bandwidth of 50 KHz, and a second IF. of 455KHz. A third ceramic filter has recently been added to address recent interference problems attributed to the recent pager frequencies allocated just above the weather satellite band.

The RF amplifier and 1st mixer use low noise BF981 dual gate MOS FET's with an SL6601 2nd mixer, IF., and demodulator. This is followed by active high and low pass filters to provide an optimum AF bandwidth for reception of APT. signals.
The synthesiser can provide 10KHz steps with specific individual channels stored in an EPROM.

A 1 watt AF output stage provides audio to drive an 8 ohm loudspeaker with two additional low level AF outputs for driving a cassette recorder.

A further AF output is provided to drive the YU3UMV framestore. This level is set using an on board preset.

FEATURES:

1. 1600 channel capability divided into 16 pages internally preset using a DIL switch with 100 channels per page. Maximum scan per page can be preset from 10 to 100 channels in steps of 10 i.e. 10,20,30, etc. Scan halts when signal received above squelch threshold. Channel is held for approx. 5 seconds after loss of signal after which scan continues.

2. Fully adjustable squelch.

3. Two low level AF outputs, one squelched the other unsquelched, (approx. 80mv R.M.S. at 17KHz deviation), for driving a cassette recorder. A further output of 1v RMS is provided to drive the YU3UMV framestore.

4. Remote control of cassette recorder by a volts free c/o contact of a relay which is controlled by the receiver squelch.

5. 'S' meter output with sensitivity adjustment. (100 to 250uA meter required).

6. DC. feed to aerial feeder available by on board linking to provide up feeder power for mast head pre-amp / down converter.

7. Unit supplied fully programmed for all known satellite APT. and Beacon channels.

8. Channel indication using 7 segment LED displays ie 00 to 99.

9. Up/down scan switch can be connected to provide quick selection of a wanted channel.

10. Scan halt and channel override facilities.

11. Optional direct frequency read-out using LCD display module.

This unit may be ordered as an assembled and tested complete with its own specific measured noise figures as a module less squelch pot, volume control, loudspeaker, up/down scan switch 'S' meter and scan halt switch from the secretary.

SPECIFICATION:

POWER REQUIREMENTS:- 11.5 to 13.5 volts DC. at 500mA max.

SENSITIVITY:- 0.2uV pd for 12 dB SINAD at 10 KHz deviation.
0.3uV pd for 20 db quieting.
S/N ratio at 1uV pd for 17 KHz deviation > 40dB
S/N ratio at 5uV pd for 17 KHz deviation > 46dB

RF BANDWIDTH:- 3 MHz @ -3 dB points.

IF. BANDWIDTH:- 50KHz

IMAGE REJECTION:- > 70 dB

AF FILTERS:- High pass filter cut off freq. = 700 Hz
Low pass filter cut off freq. = 4000 Hz
AF bandwidth 400 Hz to 4000 Hz (- 6dB points)
ie specially tailored for the reception of
Weather satellite data.

AF Outputs:- a) 1 watt RMS. into 8 ohm load for less than 10% distortion. 200 mW R.M.S. into 8 ohm load for less than 5% distortion.

b) 80 mV R.M.S. into 50 KOhm load from both squelched and unsquelched outputs for 17 KHz dev. @ less than 3% distortion.

c) 1 Volt R.M.S. into 1K ohm load for less than 5% distortion.

MEMORY ORGANISATION:- The unit is supplied pre-programmed as follows:-

Page 0:- All known APT. frequencies including U.S. and U.S.S.R. weather satellites. (10 channels)

Page 1:- Geostationary and orbital beacon frequencies, which contain the phase modulated split phase data from the low bit rate instruments and space craft telemetry. (5 channels)

Page 2:- A selection of frequencies in the 136 to 138 MHz band know to be used or have been used by APT. and non APT. satellites. (58 channels)

Page 3:- All 10 KHz steps between 136.000 to 136.990 MHz. (100 channels)

Page 4:- All 10 KHz steps between 137.000 to 137.990 MHz. (100 channels)

PCB DIMENSIONS:- 210 mm x 95 mm.

see RIG SHOP Corner for price information

DARTCOM 1.69 GHz METEOSAT DOWNCONVERTER.

This down converter has been designed to convert the signals from METEOSAT CH1 and CH2 automatic picture transmissions on 1.6945 GHz and 1.691 Ghz to 137.5 MHz for reception on a standard F.M. VHF. weather satellite receiver.

The down converter uses MFG 1202 GaAs FET's as the R.F. amplifier and mixer providing sufficient gain and low noise figure to obtain noise free pictures using the R.I.G. 1 metre dish (or similar), and suitable feed with out the need for a pre-amp.

The unit can be supplied either as a completely assembled and tested down converter in a weather proof box, or as an assembled and tested module mounted in a tin plate box.

The converter has been designed to be mounted in close proximity to the dish with all power and channel change-over facilities being supplied by the single coax cable connecting the down converter to the VHF. receiver.

If no DC. supply feed via the coax feeder is available then the complete boxed converter can be supplied with a waterproof power and channel change-over connector.

The converter can also be supplied to receive the Advanced Very High Resolution Radiometer data from NOAA orbiting satellites on 1.698 GHz and 1.707GHz to special order at a small additional cost - details on request.

When used in conjunction with the RIG synthesised VHF. satellite receiver this converter will give typically a signal to noise ratio of 32dB for 10 KHz deviation for a signal input to the converter of -112 dBm or 0.562 uV PD.

FEATURES.

1). Thermally controlled crystals to ensure channel stability over a wide range of ambient temperatures.
2) DC. powered from either direct feed to converter or via VHF. output provided that the host VHF. receiver has remote DC. feed to aerial cable facilities.
3) Unique channel change facilities.
4) 50 ohm N type socket for input and output on module.

SPECIFICATION.

DC. SUPPLY :- 12.0v to 14.5 v at a peak in rush current of 700 mA falling to 250 mA after approx. 10 seconds (crystal warm up).

INPUT R.F. CHANNELS:- 1.6945 GHz (METEOSAT CH 1)
1.6910 GHz (METEOSAT CH 2)
or to special order:-
1.6980GHz(NOAA, AVHRR)
1.7070 GHz(NOAA. AVHRR. data)

R.F. OUTPUT :-137.5MHz
OVERALL GAIN:- Typically 24 dB
NOISE FIGURE:- Typically 2 dB

R.F. TERMINATIONS:-50 ohm N type input and output on boxed converter.
50 ohm N type input and 50 ohm BNC. outputs on module.

DIMENSIONS (L x W x H) :- a). Module 181mm x 73mm x 46mm.
b). complete converter including box :-
240mm x 120mm x 100mm.

Please that these dimensions do not include connector projections.

PRICES:- see 'RIG Shop Corner overleaf'

YU3UMV FRAME STORE A to D CONVERSION RANGE ADAPTER.

INTRODUCTION.

Much has been written on the importance of setting the span of the A to D converter in order to utilise the full capability of the YU3UMV frame store.

These levels change not only between the various formats transmitted, (ie Infrared and visible light), but also vary between different satellites and from pass to pass, due to changing light levels.

A-D ADAPTOR DETAILS.

This unit consists of a ready built and tested module designed to overcome these problems. The module has been made in the form of a plug in "piggy back" board which fits in place of the ADC 0804 with the minimum of disruption to the original unit.

The module will indicate the "peak black" and "peak white" levels of whatever image is being written into the memory, whilst at the same time allowing accurate setting of both these levels to obtain the best possible pictures.

The ready assembled PCB. is supplied with "peak" black and white adjustment pots, molex connector, indicator, cable and 20 pin I.C. holder for those of you that soldered the ADC 0804 into the PCB.

Price:- see overleaf

RIG Shop Corner

Meteosat Downconvertor:-

a). Assembled and tested module in tin plate box:- £129.69 + £1.50 p&p.

b). Complete mounted in weather proof box:- £157.96 + £3.00 p&p.
Waterproof power and channel change connector £10.00 extra if required, but note these functions can all be done via the coaxial downlead.

RIG VHF Scanning Receiver

a) Basic receiver module, with LED Channel number display, fully assembled and tested
£112.55 + £1.50 p&p

b) Same module as above but with liquid crystal frequency display module replacing the LED Channel display.

£151.57 + £1.50 p&p

Cheques for above units payable to 'DARTCOM' please

The RIG VHF preamp also available includes a bandpass filter and is ideal for mast-head mounting. The spec. was printed in RIG 7. It is available from the secretary as a built and aligned PCB measuring 85mm by 33mm (3 5/16 x 1 15/16 inches).

Module including first class post £13.37

Other items available by post:

A-D module for complete control of grey levels on the framestore
£18.86

Cheques payable to "Remote Imaging Group" please

Anybody requiring PCBs should contact the secretary, G8XTW.

WHERE TO OBTAIN A RIG DISH and FEED HORN:

The RIG has had specially made, some 1 metre spun aluminium dishes and some compatible horn feed assemblies. These are intended to form the basis of an aerial system to receive signals form Meteosat II.

The cost of the dishes and feed horns has been kept to an absolute minimum. So they will not be available by any form of carriage as packing such an item would be impractical. So UK members only, sorry. They are only available to members who may only collect them from the dispatch points below or from rallies we attend in the future.

When using the dispatch points please use the telephone numbers given to reserve your dish and when collecting please pay by cheque payable to the "Remote Imaging Group".

1 Metre Spun aluminium dish for Meteosat - New thicker ver £38.00
Tubular feed horn with tripod mount for dish above £33.73

Bedfordshire
The Editor/secretary, see front cover

Oxfordshire
Dermot, G8SIN, Tel. 0865 61797
22 Ramsey Road, Headington, Oxford.

Lincolnshire
Henry, G3REH, Chairman, see front cover

Devon
Dave, G4XOU, Tel 0822 613343
15 Milton Crescent, Down Park, Tavistock, Devon.

Sussex
Des, Membership Sec. Tel. 0273 813103

Manchester
Mike (J.M.) Horrocks G8GTP, Tel 061 766 6269
"Fairview", 17 Wood Grove, Whitefield, Manchester.

Hertfordshire
Les, G8LOK, see front cover

Birmingham
Colin Hall - see front cover.

AMIGA CORNER ... James Brown

I imagine like many RIG readers the question has often been asked, can I use my home computer to display weather satellite pictures, and hence cut out the need for buying a frame-store? Until quite recently the answer would have been yes, provided that you were content with just a few grey-levels and rather chunky graphic displays. However in the last few years that's all changed! Enter the Atari ST, the Archimedes, and the Commodore Amiga, and now eat your heart out frame-store aficionados, the world of dazzling colour and screen resolutions of over 500 X 500 pixels has arrived! As one who succumbed recently to the AMIGA effect, I've been waiting impatiently for the perfect software to come along, and at last its starting to arrive.

Already one of of our own members, Bob Buttery has got an interface up and running, and having seen his pictures I can tell you they are VERY good! and I suspect there are others of you out there working on similar projects.

One company, ICS Electronics (PO Box2, Arundel, West Sussex. Tel 024 365 655) have kindly sent a couple of demo disks along with examples of what can be obtained using their interface and software, for short-wave retransmissions of weather satellite pictures etc. These are in the Amiga high-resolution format, and are quite stunning! The software has all sorts of helpful image processing techniques built in, too numerous to mention here, and they hope shortly to be able to provide a direct interface for the AMIGA to the standard satellite transmission format, with yet further improvements to make an all-singing, whistles and bells version. Hopefully, RIG may get a review version on loan, so look out for a test-drive report in the near future.

In the meantime, if you want an introduction to it all, and you own an Amiga, send me a disk and enough stamps for postage, and I'll send you my latest demo disk, complete with an 8 frame Meteosat3 animation! (Please state 512K or 1 MEG AMIGA) Send 2 disks and I'll include a copy of the ICS demo.Anyway, the editor will be sharpening his pen if I go on anymore, but if you've got any news or queries and suggestions for this corner, drop us a line and we'll see what we can do.

Cheers, James

RIG HELPLINES:

General Enquiries & PCB Supplies	Phil Seaford	0525 384419	7.30pm - 9.0pm
NOAA information	Henry Neale	094 585 353	
Russian, Chinese satellite info/status	Les Currington	0707 326058	
Schools/ Educational enquiries, Meteosat status and European Space Agency	Colin Hall	School 021 778 1311 Home 021 449 0006	
Framestore technical support	Mike Coombs	0530 243494	7.30pm - 9.30pm
"	Ian Gurton	05827 3770	7.30pm - 9.30pm
"	Dermot Dobson	Correspondence preferred	
RIG Dish & Feed Horn Stockists	see back of newsletter		
Supplier problems co-ordinator	Stan Ames	05827 60538	
RIG at Rallies 1989	Mike Coombs	see above for No.	

As Secretary I can asked for information regarding all types of micro of which I have little knowledge so to provide better information to RIG members on specific computer equipment we have identified the following helpers for specific machines & interfaces:

BBC Micro	Stan Ames	see above
Commodore Amiga	James Brown	0656 712632
Atari ST, Archimedes	Peter Newman	0487 812121
IBM PC	Dermot Dobson	see above

Please call at sensible hours ie 7.30pm - 9.30pm

spacetech

AUTHORISED DISTRIBUTORS NRSC NATIONAL SENSING REMOTE CENTRE

L. E. Hornby, 21 West Wools, Portland, Dorset DT5 2EA. Tel: 0305 822753

SPACETECH NEWS

You might have seen our new **Weather Satellite Podule** for the Acorn Archimedes at one of the rallies. The results are spectacular. Already some folks have gone out to buy an Archimedes just to run this one application..need we say more! £259.95 (rig members £249.95).Phone for full description. Demo disc £5 refundable..copy and return!
Having trouble with Meteosat P2? Our new stand-alone **Meteosat receiver** is a superb no-compromise trouble free design ..even gives noise free pics from GOES-E with a 0.9m dish! £299.95. Ask for list of our other RF and decoding equipment. We can supply the YU framestore built and cased.

BOOKS:	Memb	Non-memb
Weather Satellite Reception: Chris Hornby. A guide to get you started,Aimed at the beginner,but useful reference.	5.50	5.95
Sourcebook of Remote Sensing: A guide to products, utilities etc. V.useful information source for enthusiast	14.25	15.00
Guide to Facsimile Stations: Klingenfuss. A wealth of info not only on FAX but NOAA,Meteosat etc.	12.00	12.00
Guide to Utility Stations: Klingenfuss.For dedicated SWLs	19.00	19.00
Britain from Space: Colour Landsat Atlas of British Isles.	11.95	12.50
Images of the World: Satellite image atlas	13.30	13.95
Posters and Teaching Materials. (All posters in colour)		
The Third Planet. Meteosat Whole Disc. 400x600	1.75	1.75
British Isles.Landsat natural colour. 480x710	2.00	2.00
Europe by Satellite.NOAA HRPT. Superb! 590x780	2.50	2.50
London. Landsat colour. Thematic mapper 30m resolution.	4.50	4.95
Satellite Images (1 large,6 small charts +booklet)	4.95	4.95
Satpack 1 & 2:NOAA HRPT images with overlays, interpretation and worked examples.From Royal Met. Society. (per pack)	2.40	2.40

High Gloss Prints: Colour, resolution up to 200 million pixels per pic!
Small: 9.25 (9.75) small framed in real wood 24.00 (25.75)
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Subjects include: whole disc, NOAA AVHRR Europe,UK cloudy weather, Landsat: UK, Scotland, Ireland. GOES E whole disc, Phone/write for list
NEW: The October Hurricane, NOAA HRPT. large only. 18.50 (19.95)
Videos: All videos £51.75 or £10.00 hire (+£10.00 dep.+£1.00 P&P)
Please phone for current stock..Ideal for winter club night!
Slides: Many available with books and sound cassettes. Please write or phone for latest list before your lecture or presentation.
Equipment: All equipment listed here free P&P.

FAX1: We know it reviewed badly in RIG,but for its application i.e. HF FAX weather maps, the resolution is EXCELLENT. Phone for detailed spec and copy of more favourable review!	269.00	279.95
FAX1 + PSU + Printer (Epson Compatible Copal SC1200)	389.00	399.95
HF125 General coverage HF RX	365.00	375.00
Please phone us for your packet radio requirements.. e.g. PK232 with facsimile TRANSCEIVE (IBM,C64 s/w avail)	259.95	269.95

Single book orders £1.00 P&P. All other orders £2.00 P&P.
Equipment Orders FREE P&P .. Phone or write for latest lists/specs.

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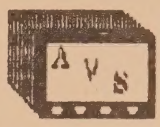

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weather satellite systems and kits

MSD20 METEOSAT DISH ASSEMBLY

A high quality, precision made aluminium dish and mount assembly, complete with dipole feed. The universal mount design enables it to be either pole, wall, or patio mounted. Used in conjunction with our MSC20 ultra low noise downconverter it is capable of superb results otherwise only achieved with larger dishes. Diameter 1m (requires no planning permission)

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MSC20 ULTRA LOW NOISE DOWNCONVERTER

The ultimate in low noise downconverters for the best possible, noise-free pictures. The MSC20 uses the latest GaSFET technology to achieve its incredibly low noise figure. The MSC20 is complete with temperature controlled Meteosat ch1 & ch2, and housed in a weatherproof ABS enclosure for masthead mounting.

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A high-performance dual-conversion design optimised for low noise and high sensitivity. It incorporates audio mute, automatic tape-recorder siwtching, electronic channel selection, S-level and deviation metering as standard. Housed in a professional steel case, and complete with all leads etc.

Performance Summary:-

RF Bandwidth (3dB)	2.5MHz
IF Bandwidth (3dB)	50KHz
1st IF Frequency	10.7MHz
2nd IF Frequency	455KHz
Image Rejection Ratio	>100dB
Sensitivity (12dB Q'ting)	150nV
(fully Q'ting)	600nV
Supply Voltage	12v d.c.

Complete, cased receiver incl leads £152.55

Kit (excl. case, but incl. all off-board components, leads etc. £78.25

Module built, with off-board comps. £96.75

Finished Case with meters, l/speaker, all connectors, leads, knobs etc. £41.60

MSA20 CROSSED-DIPOLE AERIAL

A high-quality, well finished aerial designed specifically for weather satellite use. Comes complete with ground-plane radials, and now wth pre-wired phasing harness for even easier use!

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Martelec Ltd,
108 Queens Road,
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Hants. GU14 6JR.
Tel: Farnborough (0252) 515866
Telex 859489 (MARTLC G)

MSS20 BBC BASED DECODER/SOFTWARE PACKAGE

Complete built and tested interface, designed for owners of Acorn model B, B+, and Master micros. This exceptional hardware/software package produces weather sat pictures as never before on a BBC. Host of excellent software features make this the best value system available anywhere, whether for educational or general interest usage.

Features include:-

- Zoom - x2, x4, x8
- Geyscale control for vis or I.R.
- User-defined colour palette
- North/South picture invert
- Printer dump (FX80 formats)

NOTE- The MSS20 system is capable of really excellent results, and should not be confused with other, inferior, BBC-based systems from elsewhere.

Send £3 for the demonstration disc and see for yourself.

£86.19

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* * * * NEW * * * * NEW * * * * NEW * * * *

ARCHIMEDES-BASED WEATHER SATELLITE SYSTEM

At the time of going to press, this new Spacetech system should be available. It comprises a podule for the Arch, and embodies many advanced features for picture manipulation and control. Full details available on request. Approx. price £250.

MSG20 GRAPHSTORE - HI-RES FRAMESTORE

Graphstore is a powerful high-resolution framestore, with built-in graphics processor for unparalleled picture processing power. Basic operating mode gives two hi-res pictures of 512 x 512 x 128 grey levels. Alternate animation mode gives eight pictures of 256 x 256 x 128 grey levels.

Features:-

- * Zoom any factor from 1 to 16
- * Smooth XY Scrolling
- * Disc Dump and Read
- * Post Reception Processing (PRP)
- * Picture Animation (up to 8)
- * Facsimile Option (available soon)
- * Contrast Enhancement (available Oct)
- * Printer Dump Routine

Graphstore is a professionally-built system with extensive upgrade potential - usually in software. It is fully assembled, tested and cased, with its own internal PSU, all leads and manual, and software.

£399.91

OTHER KITS AND BITS.....

MSK20 137MHz Preamplifier	- kit	£10.95
	- built	£19.95
YU3UMV Framestore *	- (64K)	£80.72
	-(128K)	£94.97
LOK Sync Board Kit		£25.85

*Temporary price increase due to World memory shortage.